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MANPOWER AND TRAINING NEEDS OF STATE WATER POLLUTION CONTROL AGENCIES

ABT ASSOCIATES, INCORPORATED

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MANPOWER AND TRAINING NEEDS OF STATE WATER POLLUTION CONTROL AGENCIES

1.0 Purpose of this Report

On November 30, 1972, the Assistant Administrator for Air and Water Programs authorized the Manpower Planning Branch of the Manpower Development Staff to define the human resource impacts of the 1972 Water Act Amendments. As the Assistant Administrator pointed out, "the precise impact in terms of expanded numbers of personnel, or for training or re-training of personnel is not known at this time." As a first step in this process, the Manpower Planning Branch initiated, in February, 1973, a project designed to develop staffing criteria for state water pollution control agencies. Users of these criteria will be able to systematically develop information concerning the numbers and types of personnel needed to implement this new legislation, as well as the training needs for these personnel.

The project on state agency manpower requirements is now complete. The purpose of this report is to:

- describe the methodology for development of staffing criteria for state water pollution control agencies
- present the results of the project,
- identify and analyze problems encountered during the project, and
- specify further actions which can be taken to provide management with full information on the human resource impacts of the Water Act.

2.0 Background

2.1 The Manpower Planning Program

The Federal Water Pollution Control Act Amendments of 1972 require EPA to ascertain the manpower and training needs of all state water pollution control organizations. Sec. 104(g)(4) requires by December 31, 1973, a report to Congress which is to include information on the overall manpower and training needs of the nation's water pollution control effort.

The Manpower Planning Branch, Manpower Development Staff, Office of Water Programs Operations has the primary responsibility for developing the manpower and training needs information. It is conducting a comprehensive program aimed at creation of a federal, state, local manpower planning system and the development of planning criteria in the form of occupation definitions and staffing guides. The program objectives and approach have been generally accepted by and working relations have been established with other federal agencies (DOL, CSC, OE), state water pollution control agencies and employer and professional organizations of the field.

Primary emphasis of the manpower planning program in the past has been in the area of operation and maintenance of wastewater treatment facilities. Occupation definitions and staffing guides have been developed and are being applied by state and local governments and private industry to wastewater treatment plants and collection systems. Other program projects in recent months have been in the area of developing manpower information for state water pollution control agencies. For example, the Manpower Planning Branch provided financial and technical support to Region V for the conduct of organization and manpower studies in the states of Ohio and Indiana.

The November 30, 1972 memorandum from the Assistant Administrator for Air and Water Programs emphasized the broad scope of concerns of the manpower planning program and focused attention on the human resource impacts of the 1972 Water Act Amendments.

2.2 The Focus on State Agency Manpower and Training Needs

As indicated above, as a first step in implementing the November 30, 1972 memorandum from the Assistant Administrator for Air and Water Programs, the Manpower Planning Branch has focused on the manpower and training needs of state water pollution control agencies. (Other activities of the manpower planning program will focus on other levels of government and the private sector). The reasons for this focus on state agencies include the following:

- As indicated in our 1972 Report to Congress, there has been a serious lack of emphasis on state manpower requirements in the past.
- The 1972 Water Act Amendments impose new responsibilities on state agencies and specifically recognize the importance of the state role in achievement of the Act's objectives.
- The precise role that the states will play in implementing the Water Act will be determined, in large part, by guidelines developed by EPA Headquarters offices. These offices need to systematically develop information on the number and types of manpower required by state agencies to implement these guidelines.
- Many state agencies need guidance from EPA as they develop their organizations and assess their staffing requirements to implement the Water Act.
- EPA Regional and Headquarters Offices need a basis for evaluating the staffing of state programs during their state program planning review process.
- As part of its annual Report to Congress, the Manpower Planning Branch has been asked to produce estimates of the state manpower necessary to implement the Water Act.

- The Manpower Development Staff needs estimates of the numbers and types of manpower required by state agencies so that it can effectively budget for training programs.
- Section 516 of the Water Act requires the Administrator to report to the Congress on the status of state programs and the requirements (including manpower requirements) for achieving the objectives of the Water Act.

In order to systematically develop this needed information on the state agency manpower requirements, an essential first step is the creation of sound staffing criteria, i.e., occupational definitions and staffing guides which will permit program managers to translate estimated program workloads into manpower requirements (both quantitative and qualitative). Once these staffing criteria have been developed and validated, they will form the basis for a predictive model for determining state agency manpower requirements. This model will specify the functions which must be performed by state water pollution control agencies and will enable the user to determine the manpower requirements for each function on the basis of the size of a workload indicator for that function.

2.3 Implementation of the November 30 Memorandum

Pursuant to the November 30, 1972 memorandum, the Manpower Planning Branch developed an approach for developing staffing criteria for state water pollution control agencies. This approach was designed to utilize (as a first step) the knowledge of headquarters program staff. It assumed that these staff, having completed their work plans for implementation of the 1972 Water Act Amendments, could build upon those work plans and systematically develop information on the numbers and types of manpower that state agencies would need to fulfill their responsibilities under the Act. The Assistant Administrator's memorandum of November 30, 1972, asked each

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program manager to designate one member of his staff as a "manpower coordinator" to assist the Manpower Planning Branch in this effort. The approach developed by the Manpower Planning Branch asked the manpower coordinators to do the following:

- identify those sections of the 1972 Water Act Amendments for which they were responsible;
- describe their program strategy for carrying out those responsibilities;
- describe the role of the various actors (EPA-headquarters, EPA-regions, states, localities) in implementation of that strategy;
- and finally, focus on the specific human resource needs of the states in order for the states to fulfill their roles effectively.

Assistance in the development and implementation of this approach was provided by Abt Associates Inc. of Cambridge, Massachusetts.

A document explaining the approach in detail was distributed to all relevant program offices on February 22, 1973. (A copy of the approach is included as Appendix A of this report.) This was followed by a briefing on February 27, 1973, designed to explain the approach to all of the manpower coordinators and to answer any questions they might have. Subsequent to that briefing, staff from the Manpower Planning Branch was made available, at all times, to answer questions and provide technical assistance to the manpower coordinators (or others) as they assembled the necessary information for the functions in their respective program areas.

2.4 Headquarters Manpower Assessment

Shortly after the state agency project had begun, top management of the Office of Water Programs Operations notified the Manpower Planning Branch that it needed immediate assistance in the assessment of headquarters manpower needs.

Therefore, staff from the Manpower Planning Branch and its contractor temporarily diverted some of their resources from the state agency project and focused, instead, on this assessment. This did not mean that work stopped on the state project. To the contrary, the manpower coordinators of the various program offices were encouraged to proceed with the work that had started in February, and staff from the Manpower Planning Branch still were readily available to provide technical assistance to these manpower coordinators, as requested.

3.0 The Approach

As we mentioned in a preceding section, a document explaining our approach to the systematic development of information on state agency manpower requirements was distributed to the manpower coordinators in all program offices on February 22, 1973. This document, in addition to explaining the background and purpose of the project, also simplified the work to be performed by the manpower coordinators into a series of sequential steps and explained to the manpower coordinators exactly what was required of them to complete each step. A brief summary of these steps appears below.

Task 1: Define the work (in your program area) to be done by a state agency.

Step 1-a: Identify and describe the programs of your Division or Office

In this step, the manpower coordinators were asked to identify:

- the sections of the Water Act which applied to their program
- the objectives of their program relative to the legislation
- the strategies which were to be used to accomplish these objectives
- the roles of the various actors in accomplishing these objectives.

Step 1-b: Define the functions in your program area to be performed by state agencies.

In this step, the manpower coordinators were asked to list and describe the functions to be performed by state agencies. A function is a major area of work, distinguished by specialized skills or knowledges required for its accomplishment. Functions, in turn, can be divided into smaller units (sub-functions) which are groups of related tasks performed within a single function.

Task 2: Prepare a staffing guide for each state agency function or sub-function.

A staffing guide is a tool used to document manpower-workload relationships. Elements of a staffing guide include:

- titles and descriptions of occupations
- a workload indicator
- staffing patterns

A staffing guide was to be prepared by the manpower coordinators for each of the functions or sub-functions in their program area.

Step 2-a: Develop a list of functional occupational definitions

In order to complete this step, the manpower coordinator was asked to complete a form for each occupation which provided the following information:

- a brief description of the major duties of the occupation
- a description of sources of qualified personnel (i.e., education and experienced requirements)
- special training requirements

This information, particularly the latter two items, is a valuable input to the manpower planning process since it permits the MDS to identify education and training needs.

Step 2-b: Determine the workload indicator for each function and sub-function.

A workload indicator is an index which can be used to quantify the magnitude of a function's workload for a particular organization.

In order to complete the step, the manpower coordinators were asked to review a list of workload indicators provided by the MPB (for which data were readily available by state), and select one which seemed to be the most relevant index of the magnitude of each function's workload.

Step 2-c: Perform a workload analysis.

The process of workload analysis consists basically of grouping together those states which had workload indicators with similar values. To complete the step, the manpower coordinators were asked to array the values of the workload indicators, by state, and then to group the 50 states into ten (or fewer) groups.

Step 2-d: Determine staffing patterns for various workload levels and complete a staffing guide for each function and sub-function.

A staffing pattern consists of the numbers and types of personnel required to perform a function with a given workload level. A completed staffing guide provides staffing patterns for each of the workload levels.

Task 3: Summarize State Manpower Requirements

The manpower coordinators were asked to integrate the data from the staffing guides into a new format--one which lists workload levels and staffing patterns for each state. The result is a summary table of the staffing requirements, by function and sub-function, for each state.

For an example of the results when all the steps have been completed, see the work submitted by the Monitoring and Data Support Division (Appendix B).

4.0 Results

The purpose of the state agency project was to define the human resource impact of the 1972 Water Act Amendments. Specifically, the project was designed to produce systematic information on the numbers and types of state agency personnel needed to implement the Act and the training needs for these personnel. These end-products, developed from the information provided by the manpower coordinators, appears in Appendices C and D at the end of this report. An additional product, a Manpower Planning Criteria Manual for State Water Pollution Control Agencies, has been bound separately and is being made available to state agency administrators and other interested individuals.

The information in the appendices and the Manpower Planning Criteria Manual is incomplete in some areas. In order to understand why this is the case, we must return to the information provided by the manpower coordinators which formed the basis for preparation of these end-products.

Section 3.0 described the steps which the manpower coordinators were requested to follow in fulfilling their roel in this project. If a manpower coordinator followed each of the steps, using the forms provided by the Manpower Planning Branch, he would have produced the following outputs:

- a description of legislative mandates, objectives, program strategies, and roles of various actors in accomplishing those objectives
- a list and description of state agency functions and sub-functions for that program area
- functional occupational definitions for all occupations required to perform the functions and sub-functions
- a workload analysis sheet for each workload indicator
- a completed staffing guide for each function and sub-function
- a manpower summary for each function and sub-function

The following matrix illustrates the extent to which the manpower coordinators of the various program offices were able to provide these outputs. For each output, we have indicated whether the output was complete, partially done, or not done at all.

PROGRAM OFFICE / OUTPUT	Legislative Mandate Objectives, Strategies and Roles	State Agency Functions	Functional Occupational Definitions	Workload Analysis Sheet	Staffing Guide	Manpower Summary	
Monitoring and Data Support Division	Complete	Complete	Complete	Complete	Complete	Complete	
Office of Research and Monitoring	Partial	Partial	Complete	Complete	Complete	Complete	
Municipal Waste Water Systems Divisions	Partial	Partial	Partial	Complete	Complete	Complete	
Oil and Hazardous Materials Division	Complete	Partial	Partial	Partial	Complete	Complete	
Manpower Development Staff	Complete	Complete	Complete	Complete	Complete	Complete	
Enforcement and General Counsel	Partial	None	Partial	None	None	None	
Water Quality Division	Partial	None	None	Partial	None	None	
Planning and Standards Branch Water Planning	None	None	None	None	None	None	

As the matrix shows, only one of the eight manpower coordinators provided no information in response to our request for cooperation. Several of those who did respond, however, were not able to provide much information. In the following paragraphs we will elaborate on the status of the data from each of the program offices.

Report on Data By Program Area

The status of three programs can be described very quickly because they were able to prepare complete manpower information with little or no assistance from our staff. They were:

- Monitoring and Data Support
- Research and Monitoring
- Manpower Development Staff

Two others faced more complex problems in developing their data, but were nevertheless able to respond after the Manpower Planning Branch staff had provided some advice and assistance. These were:

- Oil and Hazardous Materials
- Municipal Wastewater Systems

Two programs were unable to provide the required data, but they did provide some information to staff from the Manpower Planning Branch. They were:

- Enforcement and General Counsel
- Water Quality

The most important function in the Office of Enforcement and General Counsel is the administration of the Permit Program.

According to Permit Program administrators, virtually all state enforcement activities will be under the permit program in those states which choose to administer their own programs. When guidelines for state permit programs were developed in the fall of 1972, the joint federal-state committee working on these guidelines considered the question of manpower requirements for an effective state program in this area. Although specific guidelines on this subject were never issued, the committee's staffing criteria were made available to the Manpower Planning Branch. These criteria are sufficient to develop crude estimates of the manpower needs, but they are deficient in three respects: (1) they use workload indicators for which data are not yet available, (2) they make no recommendations as to the type of manpower needed to operate state permit programs; and (3) they were based on rough judgements of manpower requirements rather than systematic study.

The Water Quality Division played only a limited role in the process of determining state manpower requirements. The reasons for this lie in the division of responsibilities for implementation of the 1972 Water Act Amendments at the headquarters level of EPA. In order to be able to participate in the determination of state manpower needs, a headquarters program manager (or his manpower coordinator) must be responsible for a program strategy which includes state activities. The Water Quality Division indicated, however, that it had few, if any, corresponding state activities. The Division is responsible for developing water quality criteria, and guidelines and technical reports relating to non-point sources and environmental assessment. The most directly related state activities under the 1972 Water Act Amendments are planning and standards development, but these activities are not the responsibility of the Water Planning Division, an organizational unit outside the Office of Water Program Operations.

One program failed to respond to our request for information:

- Planning and Standards Branch, Water Planning Division.

Their non-response was particularly unfortunate since the state responsibilities within this program area are very significant (and therefore require substantial human resources). Moreover, as mentioned above, the Planning and Standards Branch of the Water Planning Division is responsible for most of the state programs related to the activities of the Water Quality Division; thus, their non-response hindered the response of that Division as well. The managers of that area indicated to us that they could not respond to our request because: (1) they had other, more pressing, business to attend to, and (2) they had serious reservations about the utility of the methodology we were employing. A copy of their memorandum explaining their position appears as Appendix E at the end of this report.

In spite of these gaps in the data, we feel that a balanced picture of the results of the project should mention the following benefits which have been derived from it:

- For all functions except state planning and permit programs, we have sufficient data to form the basis for further refinement of the estimates of state manpower requirements.

- Our approach works: it can produce staffing criteria and meaningful information on manpower requirements (though this information has yet to be validated); and it is a means for systematically relating legislative objectives and workload requirements.

- The experience gained from this project will enable us to develop specific task assignments for further refinement of the staffing criteria.

- The data developed will provide management with a decision-making tool with which they can do further manpower planning.

- Those programs which did participate in the effort indicated that it was useful to them in their own planning process.

  For example, the Director of the Monitoring and Data Support Division attached these comments to his input to our survey: "Going through this exercise using your system has been useful to us in our preparations to establish mechanisms for review of the monitoring segments of state program plans; we have dedicated about five man days to the effort, which from the point of view of my program, have been well spent."

  Similarly, the manpower coordinator for the Office of Research and Monitoring attached these comments to his input: "This seems to me to be a reasonable approach, and the positions I've identified strike me as valid and useful ones, not only from the standpoint of the States, who would have scientific advisory and research oriented expertise to address their problems and needs locally, but also from our standpoint in providing a valuable State focal point on research and monitoring matters."

5.0 Problems Encountered

We would be less than candid if we did not admit that there were some problems in the implementation of this project.

One of these problems is that some of the information produced by the manpower coordinators could have been improved by more intensive study. For example, information from the Municipal Waste Water Systems Division was prepared with a substantial amount of technical assistance from the Manpower Planning Branch. Limitation on our resources prevented further refinement of that information. Other examples are the Permit Program and Planning and Standards, where a basis for developing the necessary information existed, but where such development would have required an investment of time and resources by the relevant manpower coordinator.

Also, as Section 4.0 indicates, there are some serious gaps in the results of the project--particularly the lack of data on the state planning and permit program functions. The important question, however, is why do these gaps exist? In the following section, we will provide an analysis of these problems in implementation and suggest some hypotheses about why these problems occurred.

An analysis of the data contained in the matrix in Section 4.0 reveals some interesting findings:

- less than half of the program offices were able to provide a complete description of their legislative mandates, program objectives, program strategies, and roles of the various actors in accomplishing those program objectives.

- Only two of the eight program offices could completely describe the functions of state water pollution control agencies in implementing their programs

- only half of the program offices were able to provide complete occupational definitions for state agency personnel in their program areas.

One of the critical assumptions in our methodology was that headquarters staff would be able to adequately describe the role that states would play in the implementation of their program strategies. The results of this project indicate, however, that a significant proportion of the headquarters offices cannot describe the state role; indeed, in some offices, there has not yet been a program strategy decision about what the state role will be.

On the positive side, the matrix indicates that in those program offices where the manpower coordinators could provide a complete description of program strategy and state role in implementing that strategy, there was no difficulty in also developing the occupational definitions, staffing guides and manpower summaries.

On the basis of this analysis, we offer the following conclusions:

- Our approach to developing manpower planning criteria is feasible only if: (1) staff from headquarters program offices can define program strategies and the state role in implementing those strategies; and (2) if the time and resources are available for the production of the necessary data by the program offices.

- Not all program offices have (1) well-defined program strategies which include consideration of the role of state agencies; or (2) the time and resources to devote to the production of the types of data we requested.

- Most of the program offices which actively participated in the project agreed that the process was useful to them in their internal planning efforts. This opinion is not shared universally among the program offices, however, Indeed, there are some program offices that disagree with the approach and the utility of the results

The next question is: where do we go from here? We have completed a project which represents a first step toward the development of a systematic approach for determining manpower and training needs for state agencies through the development of occupation definitions and staffing guides. There are limitations on the data which resulted from this project, but one must remember that this was only the first iteration of a continuity process of refinement. More precise qualitative and quantitative analysis is both planned and needed. The specific nature of the steps which should be taken in the development of this process are considered fully in the next section of this report.

6.0 Conclusions and Actions to be Taken

6.1 Frame of Reference

Before discussing the next steps of this manpower planning effort, it will be useful to provide a frame of reference which helps to explain the rationale of these next actions. Essentially this draws upon the experience gained from the state agency project described above and also from previous related manpower planning experience in the wastewater facility area.

The basic tools of manpower analysis are occupation definitions and staffing guides which provide generally accepted relationships between defined and dimensioned workloads and qualitative/quantitative manpower requirements. Elements of this analysis include: definition of the work to be done, identifying the skills and training required to accomplish the work, (and documenting this in the form of an occupation definition), and measuring the amount of time or manpower input required to accomplish a defined amount of work (a staffing criterion). Many methods are available for the development of these criteria. These methods range from obtaining judgements from managers and staff specialists who are knowledgeable about the work to be done to intensive task analysis and work measurement. The approach to be applied depends upon the type of workload (Can it be readily defined? Is it reoccurring?) and the resources that are available to develop the criteria. After the criteria are developed, they must be validated, documented and disseminated, and kept up to date with changes in technology and manpower utilization practices.

After the manpower planning criteria are available, manpower analysis and assessment can be made. As described in the EPA Manual, "Manpower Planning for Wastewater Treatment Plants" meaningful assessments must be made in terms of employment--i.e., recommended, budgeted and actual numbers of new hires and upgrades. On the basis of this information determinations can be made concerning the ability of existing staff to handle the workload, training needs, manpower productivity, and the like. This information also provides a basis for determining the workloads for various types of training (entry-level, upgrade and update training). Once these analyses are completed, the manpower planner can prepare specific action plans for developing the necessary manpower resources and overcoming manpower problems.

6.2 Action to be Taken

The following actions will be taken to provide management with information concerning the manpower impact of the new legislation, to generate information for the Report to Congress on manpower, and to continue the implementation of the OWPO Manpower Planning Program.

These actions are within the constraints of anticipated FY-74 resources for the Manpower Planning Program, i.e., three professional positions, no funds for contract assistance from EPA, but a $50,000 contract funded by the Office of Education to develop a manpower planning manual covering the overall water pollution control and water supply program. (One element of the manual will be manpower planning for state water pollution control and water supply agencies.)

1. Validation and dissemination of occupation definitions and staffing guides

The occupation definitions and staffing guides (contained in the Manpower Planning Criteria Manual for State Water Pollution Control Agencies will be disseminated to the regional offices and states for their reactions, comments, and suggestions for improvement. The virtue of our approach lies in the fact that we have made a systematic attempt to develop manpower planning criteria. What we will give to the regional offices and the states is something more than a mere list of numbers; it will be manpower information based on workload indicators plus a fully-detailed and logical method for arriving at those manpower needs.

Nevetheless, we realize that all manpower determinations from headquarters could be subject to misinterpretation. Even though they clearly are a "first-cut approximation," subject to further refinement, regional offices and states may interpret them as headquarters "mandates" unless we follow a careful procedure for dissemination. What we recommend are the following steps:

- Representatives from each of the regional offices should be invited to Washington for a one-day briefing on the nature and uses of the manpower information. This briefing will stress the tentative nature of the estimates and encourage reactions from the regional offices in a structured manner.
- After review by the regional offices, the regions would be encouraged to hold similar, structured meeting with representatives from each of their states. Again, there would be an emphasis on the tentative nature of the criteria, and state reactions would be encouraged.
- After input from both the regional offices and the states, the criteria would be returned to the Manpower Planning Branch for final review and validation.

2. Extension of the occupation definitions and staffing guides to functional areas not covered

The Assistant Administrator for Air and Water Programs will be asked to request assistance again from the Assistant Administrator for Enforcement and the head of the Planning Division to complete the work required for the state agency project, i.e., development of occupation definitions, staffing guides and manpower requirements of the functions for which they have responsibility. As indicated in Section 4.0, these functions represent the major gaps in the project to date.

3. Assessment for Report to Congress

After the necessary functional definitions, occupation definitions and staffing guides are completed, a survey of current and projected state agency manpower requirements and utilization will be made in cooperation with Regional Manpower Development Staffs. This is intended to develop measures, on a current and five-year basis, of recommended, budgeted and actual employment together with estimates of entry level, upgrade and update training needs.

4. Cost benefit analysis

The use of systematic modern methods for manpower analysis is generally accepted by state agencies, employers and professional associations in the wastewater treatment facilities area, occupation definitions and staffing guides are being applied and manpower planning approaches have been developed and implemented. The Office of Education has recently made a $200,000 grant for development of manpower planning criteria for water supply systems. The question for a cost benefit analysis: should modern manpower technology be employed in a critical area of the Water Pollution Control Program - state water pollution control agencies? We believe that if the Federal Government is investing 40 million dollars per year in state programs (75% in personnel costs), a 1% investment to apply proven techniques would be prudent and consistent with practices of private industry and other federal agencies such as the Department of Defense as well as Administration objectives for productivity improvement.

In light of the fact that previously budgeted FY-74 funds for this purpose were reallocated to "higher priority" areas, the Office of Planning and Evaluation will be asked to assist the Manpower Planning Branch in conducting a cost benefit analysis relative to the application of modern task analysis and work measurement techniques to develop occupation definitions and staffing guides for state agencies.

5. Extention of the manpower planning effort to EPA regional offices

Administration policy places substantial reliance on the states for implementation of the 1972 Water Act Amendments. The precise allocation of responsibilities (between the states and EPA Regional Offices) is not yet entirely clear, however; final allocations depend to a great extent on the role that states choose to play in implementing the legislation. To the extent that states decide not to assume an active role in implementation, the work must be performed by the EPA Regional Offices, and this will require corresponding increases in manpower at the Regional Office level. EPA management needs a tool to make resource allocation decisions which reflect the workload of the region as well as the level of financial assistance to state programs. Preliminary discussions with the Director of the Office of Resource Management indicate an interest in pursuing the need for and means of extending the state agency manpower studies to the EPA Regional Offices.

APPENDIX A

METHOD FOR ESTIMATING WATER POLLUTION CONTROL MANPOWER REQUIREMENTS

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METHOD FOR ESTIMATING
WATER POLLUTION CONTROL
MANPOWER REQUIREMENTS

Prepared for

Manpower Planning Branch
Manpower Development Staff
Office of Water Programs Operations

by

Abt Associates

February 1973

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INTRODUCTION

The Assistant Administrator for Air & Water Programs, in a memorandum to all Program Managers on November 30, 1972, expressed his concern about the impact of the implementation of the 1972 Water Act on human resources. As he pointed out, the precise extent of the impact in terms of the numbers and types of personnel needed is not known at this time. This is a problem which directly concerns all Program Managers, for in a very real sense, the successful implementation of any Program depends upon the availability of the right numbers and types of manpower when they are needed.

The purpose of this document is to provide a methodology, consistent with EPA strategies, which all program offices can use to generate estimates of the numbers and type of personnel required to staff water pollution control agencies. Such estimates can also be used by program offices to prepare their work plans and to evaluate state and local program plans.

The approach being taken is based on the assumption that manpower requirement determination can best be made by those who know what work needs to be done and how. Manpower specialists can assist by suggesting estimating methods and data sources.

The methodology to be applied will be explained in the following pages. In addition, the Manpower Development Staff will hold a meeting on this method to provide further explanation. The Director of each Program Division (or Office) within OWPO and selected support offices has been asked to designate a manpower coordinator (MC). The MC will be responsible for applying the methodology and compiling the necessary information in cooperation with the program specialists of his organization, and generating the manpower estimates. MDS staff will be available for consultation and technical assistance at all times.

Although the general approach and methodology contained in the following pages could be used for water pollution control manpower planning at all levels of government, the most significant need at the present time is to estimate the numbers and types of people needed to staff state agencies in order to implement the Federal Water Pollution Control Act Amendments of 1972. Therefore, the procedural steps which follow have been oriented toward the specific task of state program manpower needs estimation.

As experience is gained, MDS intends to improve the methodology and guidance materials. Your suggestions for improvement are solicited.

TASK 1: Define the work (in your program area) to be done by a state.

STEP 1-a: Identify and describe the programs of your Division or Office

In order to define the work in your program area which is to be done by a state water pollution control agency, it is helpful to review your programs and focus on the relationship of state agency activities to the implementation of those programs. (For purposes of this effort, program definitions now used for work and budget planning should be used to the maximum extent).

In reviewing your programs you should identify the following:

-- The sections of the Act which affect your program

-- the objectives of your division or office, relative to the legislation

-- the methods or strategies which will be used to accomplish these objectives

-- the roles of the various actors in accomplishing these objectives (i.g., EPA Headquarters, EPA Regions, other federal agencies, states, local governments, and the private sector)

Please indicate how alternative strategies will affect your plans.

As an example to assist you in this effort, the Manpower Development Staff has gone through this process for its programs. The results of that effort appear in Exhibit 1.

STEP 1-b: Define the functions to be performed by state agencies

A function is a major area of work, distinguished by specialized skills or knowledges required for its accomplishment, which is usually performed by a major organizational component.

For example, in a state water pollution control agency, the basic functions might include: monitoring, issuing permits, planning, enforcement, administration, etc.

Functions, in turn, can be divided into smaller units called sub-functions. A sub-function is a group of related tasks performed within a single function.

For example, within a division responsible for issuing permits, some sub-functions might include: processing permit applications, inspecting control facilities to see that they conform to the specifications on the application, issuing the permit, filing permit information, and so forth.

The list of functions which you develop for your program area should not be very long. It is unlikely that the total number of functions and sub-functions for any program area would exceed 10. As a rule of thumb, it often is useful to sub-divide functions into sub-functions when the workload indicator for the sub-function is different from that of the function. Further explanation of the Workload Indicator is given in Step 2b.

- For example, in the case of the permit function, all work -- for both functions and sub-functions -- is related to the number of permit applications received. Thus one would not need to sub-divide into sub-functions.
- In contrast, consider the municipal treatment facilities function. The workload of the sub-function(s) in the construction area is related to the workload indicator "volume of construction," but the workload of the sub-function(s) in the operations and maintenance area is related to the workload indicator "the number of plants" in place. Thus it might be desirable to sub-divide into sub-functions.

To assist you in STEP 1-b, we have done two things:

- First, we have prepared a suggested list of major functions and sub-functions for state water pollution control agencies. This appears as Appendix A.
- Second, we have defined the Manpower Development function of a state agency. This definition appears in Exhibit 2.

TASK 2: Prepare a staffing guide for each state agency function or sub-function

A staffing guide is the tool used to document manpower-workload relationships. Please see Exhibit 5 for example.

Elements of a staffing guide include:

a. Function definition (step 1b)
b. Titles and descriptions of occupations (step 2a)
c. Workload indicator (step 2b)
d. Staffing patterns showing numbers and types of people required for different levels of workload (step 2d).

The steps in preparing such a guide for each of the functions and sub-functions in your program area are as follows:

STEP 2-a. Develop a list of occupational titles with brief definitions which are involved in the work of your program area

As shown in the example of Exhibit 5, the range of occupations is the vertical axis of the staffing guide. In order that your staffing guides be most relevant to your program areas it is useful to develop a list of all those occupations which are involved in the work of your program area. To assist you in this effort, the Manpower Development Staff will make available a publication "Dictionary of Water and Water Pollution Control Occupations." You may select relevant titles from the "Dictionary." You will probably need to develop additional titles which you determine to be important to your program area.

It is desirable that titles used be functional, i.e., they are related to specific functions to be performed by state agencies. For example, we prefer titles like "basin planner," "Wastewater Systems Design Engineer" and "Wastewater Systems Operations Technician," instead of traditional, non-functional titles like "sanitary engineer" or "engineering technician." The reason for developing these functional definitions is that they add flexibility to the manpower development process. A job which is functionally defined can be filled by personnel with skills more clearly matched with job requirements.

The occupation definition should be a brief description of the purposes and the major duties of the occupation. Information on sources of qualified personnel (education and experience requirements) and special training requirements (short courses) is also needed.

As an example of the process of selecting the appropriate occupational titles and defining them, you might wish to consider the list and definitions which we have developed for the Manpower Development Staff. Exhibit 3 contains an Occupation Definition in the desired format.

STEP 2-b: Determine workload indicator for each function and sub-function

A workload indicator is an index which can be used to quantify the magnitude of a function's workload for a particular organization. Clearly, the workload for the permit issuance function is going to vary from state to state. In large, industrialized states, there are likely to be more permits than small, rural, sparsely populated states. In order to determine the number of personnel required for any given function in a given state, we need a workload indicator.

For example, consider a function like "monitoring" in a state water pollution control agency. The workload of the monitoring function is determined by a number of different factors, but one of the most important is the number of miles of waterways which must be monitored. Another is the number of wastewater treatment plants on these waterways. The larger these numbers, the larger the workload for the monitoring function.

Of course, not all functions are like monitoring. Planning, for example, is not routinized like monitoring. The product of the planning function consists of a limited number of plans produced throughout the year. The workload required to produce these products depends, in part, on the number of plans. But it also depends on the type of plans. Plans for large urbanized river basins, for example, require more manpower than plans for small rural basins.

The selection of workload indicators is an important step in the manpower planning process, and it is one where we hope to use the knowledge and experience of program personnel. When choosing the indicator, the most important point to remember is that it MUST utilize already published, and readily available data. A listing and tabulation of possible indicators are contained in Appendix B. Do not be disturbed if one workload indicator seems most appropriate for more than one function. This is quite possible given the high intercorrelation among workloads in related functions. Moreover, the fewer the workload indicators, the less data collection will be required in preparation of the staffing guide -- so it may be an asset.

Appendix B was obtained from the data base being developed for the State Programs Branch by American Management Systems (AMS). If this data is used, refer to source as "State Programs Data Base."

STEP 2-c. Perform a workload analysis

Once you have selected workload indicators, your next task is to find the values of those indicators for each of the states. It is possible that each state might have a different value, yielding 52 different values in all (for the states and territories). These values, however, must appear on one axis of the staffing guide. Clearly, it would not be feasible to make a separate column for each of 52 different values of workload indicators. On the contrary, the number of columns should be limited (with a maximum of ten). Instead of a single value, each column will contain a range of values, representing a group of states with similar values for that particular workload indicator.

Because the workload analysis process will yield data which must be used in later steps, it is important that these data be recorded on a form. We have prepared a form (WORKLOAD ANALYSIS SHEET), and it appears in Exhibit 4.

When completing this form, note the following:

- -- A separate form should be completed for each workload indicator.
- -- The form should list those functions and sub-functions which are related to this indicator.
- -- The source of the data for the indicator should be identified.

-- Column 1 has been completed for you. It contains a list of the states in alphabetical order.

-- In Column 2, space is provided for you to enter the value of the workload indicator for each state. (For example, if the workload indicator is the number of manufacturing plants in a state, and if you find that Alabama has 15,000 then 15,000 should be entered in Column 2 opposite Alabama.

-- The states should be rank-ordered according to their respective workload indicator values, and their names listed in Column 3. If California has the highest value, it should be listed first, and so forth.

-- in Column 4, space is provided for you to enter the values of the workload indicators for each state in Column 3. In contrast with Column 2, the values in Column 4 should have a definite order to them -- going from highest to lowest

-- After examining the list of workload indicator values in Column 4, you should group the states into several categories. The objective of this exercise is to group together those states which are most alike on the basis of their workload indicator values. In most cases, this will not be a difficult task. Certain natural groupings will become evident.

-- An examination of which states are together in a group will be helpful in testing the appropriateness of the indicators. If you find that the members of the group appear "similar" after a subjective evaluation, then the indicator used may be considered satisfactory for now. If there are a large percentage of apparent anomalies, then a different indicator is needed.

STEP 2-d: Determine staffing patterns for various workload levels and complete staffing guide for each function and sub-function

Staffing patterns are intended to be based on those relationships which are generally accepted by professionals responsible for the program area. At this point in time it is not possible to obtain precise relationships. Rather, we are relying on the considered judgment of representatives from the program divisions and offices. The patterns can be arrived at on the basis of existing practices in those states considered to be performing properly the function in question -- with adjustments by the program specialist on the basis of his considered judgments and the advice of others.

As you work on the staffing guides for your program areas you should find that the development of a staffing guide is an iterative process. Information developed in later stages of the task may suggest revisions in earlier determinations. This is entirely appropriate; indeed, it is encouraged if the alterations produce staffing patterns which better reflect the considered judgment of the program managers.

The Manpower Development Staff has prepared staffing guide forms for use in this step. An example of this form (STAFFING GUIDE) appears in Exhibit 5.

The MDS, in cooperation with program offices, plans to apply more intensive work measurement and occupational analysis techniques to refine the staffing guides developed in this effort.

TASK 3: Summarize State Manpower Requirements

This is the final task in the manpower planning process, and it is the simplest. It consists of integrating the data from the Workload Analysis Sheet and the Staffing Guide to a new format -- one which lists the workload levels and staffing patterns for each function for each state. The purpose behind preparation of this summary sheet is that it will provide OWPO with an easy-to-use summary of the staffing requirements for each state and the total of all states.

A Manpower Summary form similar to the MDS example which appears in Exhibit 6 must be completed for each function and sub-function in your program area.

EXHIBIT I

PROGRAM DESCRIPTION

MANPOWER DEVELOPMENT

I. Outline of Legislation: Water Pollution Control Amendments of 1972

Section 104: National program for research, investigations, training and information

Section 104(a)(1): National Training Program

Section 104(b):

- (1) Training information collection and dissemination
- (3) Grants to public and non-profit agencies
- (4) Contracts to public and private agencies
- (5) Research Fellowships for graduate students

Section 104(g):

- (1) O/M training
- (2) Manpower forecasting
- (3) A - Training Project Grants
- (3) B - EPA Research Fellowships
- (3) C - Direct technical training
- (4) Report to Congress (12/31/73)

Section 109(a): Grants and contracts for undergraduate training

- (A) O/M planning
- (B) Training facilities
- (C) Short term courses
- (D) Innovative programs
- (E) Training method research

Section 109(b): Training facility grants

Section 110(a): Application for grants/contracts

(b): Allocation of grants/contracts

Section 111: Undergraduate scholarship awards

Section 112(a): Training definition

(b): Annual report on training

(c): Training authorization

Section 516(a): Annual Report to Congress

II. Objective(s): Assuring that there is an adequate number of trained personnel to meet the needs of the National Water Pollution Control Program.

III. Strategy(s): To establish capabilities in state and local water pollution control agencies to determine their manpower and training needs and to plan and conduct necessary training programs in cooperation with counterpart manpower and education agencies. The Manpower Development Staff is to assist and provide technical and financial assistance to state and local agencies in developing the necessary capabilities through: (1) provision of manpower planning and training guidance materials which can be most economically be provided from one source; (2) provide financial and technical support in areas for which capabilities do not exist in state and local agencies; (3) conduct training in water pollution control technology and management systems which cannot economically be given or which capabilities have been established in individual states.

IV. Roles and Responsibilities:

A. EPA Headquarters -

1. Formulate and administer overall program to rectify imbalances, relative to supply, and plan regional programs.
2. Develop and provide guidance to federal-state-local manpower planning system.
3. Develop and disseminate manpower planning and training materials.
4. Fill in technical and training gaps of EPA regions.
5. Administer training and manpower development grants and contracts.
6. Provide technical and financial assistance to state/local agencies.

B. EPA Regions

1. Make regional forecasts of manpower and training needs.
2. Provide technical assistance.
3. Fill in existing training gaps of state and local agencies.
4. Administer training/manpower contracts and grants.

C. Other Federal Agencies

1. Incorporate WPC courses/materials into existing projects such as CAMPS.
2. Provide technical/financial assistance.
3. Implement state certification requirements.

D. State Agencies

1. Formulate and administer overall state manpower program.
2. Administer training programs and projects.
3. Determine state manpower needs and training requirements and plan programs to meet these needs.
4. Provide EPA with manpower and training information.
5. Plan and implement solutions to problems concerning the recruitment, retention and utilization of state personnel.
6. Administer operator certification program.

E. Local WPC Agencies

1. Determine manpower and training requirements and plan programs to meet needs in cooperation with state and local agencies.
2. Conduct training course and provide for on-the-job training of personnel.
3. Implement solution to recruitment, retention and utilization problems through modern personnel management practices.

F. Private Sector

1. Conduct on-the-job training and highly specialized industrial water pollution control courses for own personnel.
2. Provide for modern personnel management practices including career opportunities, competitive salary structure and certification program participation.

EXHIBIT 2

LIST AND DEFINITION OF STATE AGENCY FUNCTIONS

MANPOWER DEVELOPMENT PROGRAM

FUNCTION: Manpower Development

Develops and implements a statewide water pollution control manpower development system directed to assuring the continued availability of trained and motivated personnel to maintain an adequate water supply and for the prevention, control, and abatement of water pollution. Provides a focal point in the State Water Pollution Control Agency for matters related to manpower planning, manpower development and utilization. Coordinates development of a manpower planning system to relate manpower needs to training requirements. Coordinates, develops, and manages programs in the state to train wastewater treatment plant operators. Coordinates program to develop curricula and training materials in support of programs. Develops cooperative federal, state and local intergovernmental relationships. Provides the initiative and leadership in the development of local programs. Administers a certification program to ensure that water supply and wastewater treatment plants are managed and operated by properly qualified personnel.

Note: No sub-functions

EXHIBIT 3

OCCUPATIONAL DEFINITION

Program: Manpower Development

Function: Manpower Development

Sub-function: --

Occupational title: Training Specialist

Duties: Administers and coordinates training programs statewide, for personnel in professional and non-professional water pollution control jobs. Coordinates with and maintains liaison with federal, state and municipal education and training organizations. Coordinates with other agencies and develops programs to train wastewater treatment plant operators and other personnel categories. Develops curricula and training materials. Provides assistance to educational institutions to obtain resources for training. Identifies and coordinates training requirements with state manpower planning specialist. Serves as training advisor. Reviews and evaluates training program effectiveness.

Sources (education and experience): Source: Water Pollution Control Education area. Past instructor, monitor or experience in education and training with other state or local organizations and institutions. College degree in education, sanitary engineering, chemistry or equivalent required. At least 4 years experience in governmental training and education programs required. Must have knowledge of modern education practices.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

Annual short course in modern education techniques - 1 week
Annual course in water pollution training techniques - 1 week

EXHIBIT 4

Sheet 1 of 2

WORKLOAD ANALYSIS SHEET

Program Manpower Development

Function Manpower Development

Sub-Function None

Workload Indicator Total Pollution Sources= Total Industries, Municipalities, Power Plants and Feedlots

Source of Workload Indicator EPA State Programs Data

Base Variable #11

States	Workload Indicator Levels	States	Workload Indicator Levels
AL	5,196	NY	43,733
AK	359	CA	32,888
AZ	1,813	IL	19,905
AR	3,128	PA	19,439
CA	32,888	OH	16,200
CO	2,971	MI	15,505
CT	5,986	NJ	15,097
DE	553	TX	13,938
FL	8,522	MA	11,121
GA	7,432	NC	8,742
HI	734	FL	8,522
ID	1,338	WI	8,490
IL	19,905	GA	7,432
IN	7,420	IN	7,420
IA	4,146	MO	7,097
KS	3,190	CT	5,986
KY	3,270	MN	5,974
LA	3,850	WA	5,370
ME	2,437	TN	5,306
MD	3,788	VA	5,265
MA	11,121	AL	5,196
MI	15,505	OR	4,723
MN	5,974	IA	4,146
MS	3,001	LA	3,850
NO	7,097	MD	3,788
MT	1,177	SC	3,735
NE	2,699	KY	3,270
NV	374	KS	3,190
NH	1,522	AK	3,128
NJ	15,097	OK	3,048
NM	894	MI	3,001
NY	43,733	CO	2,971

EXHIBIT 4

Sheet 2 of 2

WORKLOAD ANALYSIS SHEET

Program Manpower Development

Function Manpower Development

Sub-Function None

Workload Indicator Total Pollution Sources= Total Industries, Municipalities, Power Plants and, Feedlots

Source of Workload Indicator EPA State Programs Data

Base Variable #11

States	Workload Indicator Levels	States	Workload Indicator Levels
NC	8,742	RI	2,725
ND	710	NE	2,699
OH	16,200	ME	2,437
OK	3,048	WV	2,362
OR	4,723	AZ	1,813
PA	19,439	NH	1,522
RI	2,725	ID	1,338
SC	3,735	UT	1,212
SD	880	MT	1,177
TN	5,306	VT	975
TX	13,938	NM	894
UT	1,212	SD	880
VT	975	HI	734
VA	5,265	ND	710
WA	5,370	DE	553
WV	2,362	WY	419
WI	8,490	NE	374
WY	419	AL	359
CZ		CZ	
DC	596	DC	596
GU		GU	
PR		PR	
VI		VI	

STAFFING GUIDE

Sheet 1 of 1

Program Manpower Development

Function Manpower Development

Sub-Function None

Workload Indicator Total Pollution Sources = Total Industries, Municipalities, Power Plants and Feedlots

Source of Workload Indicator EPA State Programs Data Base Variable #11

Occupational Title	Quantitative Personnel Requirements									
	Increments of Workload Indicator									
	48,000 24,000	24,000 12,000	12,000 6,000	6,000 3,000	3,000 2,000	2,000 1,000	1,000 0			
Director	1	1	1	1	1	1*				
Manpower Specialist	1	1					1*			
Training Specialist	2	2	2	1	1	1				
Manpower Planning Spec.	1	1	1	1	1	1				
Manpower Technician	2	1	1	1			1			
Clerk-typist-Secretary	3	2	2	2	1	1	1			
Certification Administrator	1	1	1	1	1	*	*			
Certification Clerk	2	2	1	1	1	1				
TOTAL STAFFING	13	11	9	8	6	5	3			

Prepared by R. Rose

Date February 1973

EXHIBIT 5
STAFFING GUIDE

*Work performed by designated individual

EXHIBIT 6
MANPOWER SUMMARY

Sheet 1 of 4

Function Manpower Development

Program Manpower Development

Sub-Function None

Prepared by R. C. Rose

Workload Indicator - Total Pollution Sources= Total Industries, Municipalities, Power Plants and Feedlots

Date February 1973

		OCCUPATION											
State or Territory	Level of Work-Load	Director	Manpower Specialist	Training Specialist	Manpower Planning Specialist	Manpower Technician	Clerk-typist-Secretary	Certification Administrator	Certification Clerk			TOTALS	
AL	5,196	1		1	1	1	2	1	1			8	
AK	359		1		1	1						3	
AZ	1,813	1		1	1		1		1			5	
AR	3,128	1		1	1	1	2	1	1			8	
CA	32,888	1	1	2	1	2	3	1	2			13	
CO	2,971	1		1	1		1	1	1			6	
CT	5,986	1		1	1	1	2	1	1			8	
DE	553		1			1	1					3	
FL	8,522	1		2	1	1	2	1	1			9	
GA	7,432	1		2	1	1	2	1	1			9	
HI	734		1			1	1					3	
ID	1,338	1		1	1		1		1			5	
IL	19,905	1	1	2	1	1	2	1	2			11	
IN	7,420	1		2	1	1	2	1	1			9	
IA	4,146	1		1	1	1	2	1	1			8	
KS	3,190	1		1	1	1	2	1	1			8	
KY	3,270	1		1	1	1	2	1	1			8	

MANPOWER SUMMARY Sheet 2 of 4

Function Manpower Development Program Manpower Development

Sub-Function None Prepared by R. C. Rose

Workload Indicator- Total Pollution Sources= Total Industries, Municipalities, Power Plants and Feedlots Date February 1973

State or Territory	Level of Work-Load	Director	Manpower Specialist	Training Specialist	Manpower Planning Specialist	Manpower Technician	Clerk-typist-Secretary	Certification Administrator	Certification Clerk			TOTALS
LA	3,850	1		1	1	1	2	1	1			8
ME	2,437	1		1	1		1	1	1			6
MD	3,788	1		1	1	1	2	1	1			8
MA	11,121	1		2	1	1	2	1	1			9
MI	15,505	1	1	2	1	1	2	1	2			11
MN	5,974	1		1	1	1	2	1	1			8
MS	3,001	1		1	1		1	1	1			6
MO	7,097	1		2	1	1	2	1	1			9
MT	1,177	1		1	1		1		1			5
NE	2,699	1		1	1		1	1	1			6
NV	374		1			1	1					3
NH	1,522	1		1	1		1		1			5
NJ	15,097	1	1	2	1	1	2	1	2			11
NM	894		1			1	1					3
NY	43,733	1	1	2	1	2	3	1	2			13
NC	8,742	1		2	1	1	2	1	1			9
ND	710		1			1	1					3

MANPOWER SUMMARY

Sheet 3 of 4

Function Manpower Development

Program Manpower Development

Sub-Function None

Prepared by R. C. Rose

Workload Indicator - Total Pollution Sources= Total Industries, Municipalities, Power Plants and Feedlots

Date February 1973

State or Territory	Level of Work-Load	OCCUPATION										
		Director	Manpower Specialist	Training Specialist	Manpower Planning Specialist	Manpower Technician	Clerk-typist-Secretary	Certification Administrator	Certification Clerk			TOTALS
OH	16,200	1	1	2	1	1	2	1	2			11
OK	3,048	1		1	1	1	2	1	1			8
OR	4,723	1		1	1	1	2	1	1			8
PA	19,439	1	1	2	1	1	2	1	2			11
RI	2,725	1		1	1		1	1	1			6
SC	3,735	1		1	1	1	2	1	1			8
SD	880		1			1	1					3
TN	5,306	1		1	1	1	2	1	1			8
TX	13,938	1	1	2	1	1	2	1	2			11
UT	1,212	1		1	1		1		1			5
VT	975		1			1	1					3
VA	5,265	1		1	1	1	2	1	1			8
WA	5,370	1		1	1	1	2	1	1			8
WV	2,362	1		1	1		1	1	1			6
WI	8,490	1		2	1	1	2	1	1			9
WY	419		1			1	1					3

MANPOWER SUMMARY

Sheet 4 of 4

Function Manpower Development

Program Manpower Development

Sub-Function None

Prepared by R. C. Rose

Workload Indicator - Total Pollution Sources= Total Industries, Municipalities, Power Plants and Feedlots

Date February 1973

State or Territory	Level of Work-Load	Director	Manpower Specialist	Training Specialist	Manpower Planning Specialist	Manpower Technician	Clerk-typist-Secretary	Certification Administrator	Certification Clerk			TOTALS
CZ	350 (Est)		1			1	1					3
DC	596		1			1	1					3
GU	350 (Est)		1			1	1					3
PR	2,500 (Est)	1		1	1		1	1	1			6
VI	350		1			1	1					3
TOTALS		42	21	57	42	45	87	37	50			381

APPENDIX A

STEP 1-b(1)

Partial List of Major Functions -- Sub-Functions for State Water Pollution Control Agencies

---

Surveillance

Monitoring

Surveys

Inspection Control & Investigations

Standards Development (Water Quality)

Technical Information Services

Basin Planning

Inter-governmental/state Relations

Permits

Enforcement

Legal Services

Manpower Planning

Training

Certification

Administration

Financial Management

State & Inter-state Agency Program Grants

Federal Activities

Pollution Emergency Center

Municipal Facility Design & Construction

Municipal Facility Operation & Maintenance

Research

Other Point Source Pollution Control

Non-Point Source Pollution Control

Ocean Dumping

Oil & Hazardous Materials

Water Supply

Laboratory Operations

Personnel Management

Public Affairs

Data Processing Support

Contract Management

Grants Management

Program: Policy, Planning & Procedures

System Analysis & Economic Studies

Watercraft Pollution Control

River Basin Planning Grants

Technical Field Investigations

Dredging Operations

Estuarine Studies

APPENDIX B

LISTING AND TABULATION OF WORKLOAD INDICATORS

Extracted from State Program Data Base

Variable #	Data Item
3	Total Population
4	1963 Wet Industries
5	Average Income (1)
6	Area
7	27 Selected industries and Municipalities and power plants and feedlots
8	Urban population
9	Average Income (2)
10	Value Added
11	Total pollution sources equal total industries and municipalities and power plants and feedlots
12	Industries w/o 241 & 242 (timber prods.)
14	Population with primary or intermediate treatment
15	Population with secondary or tertiary treatment
16	Feedlots
17	Municipalities
18	Farms with 500 cattle
19	Farms with 200 hogs
20	Gals. of industry discharge
--	1971 State Funds Expended

APPENDIX B

LISTING AND TABULATION OF WORKLOAD INDICATORS

Extracted from State Program Data Base

Variable #	Data Item
21	Milk farms 200 head
22	NPPI
23	Number of major polluters
24	Number of pipes output from major polluters
25	Cumulative PDI
--	1972 Program Grants
--	1972 State Funds

DESCRIPTIVE DATA ABOUT STATES
(PREPARED FOR EPA BY AMERICAN MANAGEMENT SYSTEMS, INC.)

STATE	VAR 3	VAR 4	VAR 5	VAR 6	VAR 7	VAR 8	VAR 9	VAR 10	VAR 11	VAR 12	VAR 14
ALABAMA	3510000.	1537.	2835.	51609.	2905.	2017000.	2371.	3526.	5196.	869.	639.
ALASKA	325000.	119.	4280.	586412.	222.	169000.	4100.	130.	359.	138.	21.
ARIZONA	1949000.	531.	3349.	113909.	419.	1479000.	3057.	495.	1813.	348.	16.
ARKANSAS	1978000.	1082.	2745.	53104.	1587.	972000.	2316.	1558.	3128.	548.	165.
CALIFORN	20468000.	13499.	4333.	158693.	5694.	18402992.	3996.	23194.	32888.	4821.	12454.
COLORADO	2357000.	938.	3621.	104247.	1507.	1804000.	3324.	1509.	2971.	861.	649.
CONNECTI	3042000.	2476.	4735.	5009.	931.	2372000.	4307.	6390.	5986.	889.	1382.
DELAWARE	565000.	286.	4292.	2057.	155.	402000.	836.	9580.	553.	155.	21.
DISTRICT	748000.	112.	5469.	67.	10.	741000.	4405.	333.	596.	10.	0.
FLORIDA	7259000.	2659.	3455.	58560.	2264.	5703000.	3202.	3683.	8522.	1424.	420.
GEORGIA	4721000.	2329.	3249.	58876.	3844.	2798000.	2812.	4684.	7432.	1612.	516.
HAWAII	809000.	174.	4206.	6450.	145.	655000.	3580.	326.	734.	145.	49.
IDAHO	756000.	432.	3086.	83557.	836.	490000.	2723.	503.	1338.	426.	147.
ILLINOIS	11251000.	9781.	4462.	56400.	4313.	9293000.	4003.	20016.	19905.	3806.	855.
INDIANA	5291000.	3387.	3777.	36291.	1713.	3428000.	3423.	16308.	7420.	1479.	545.
IOWA	2849000.	1482.	3655.	56290.	1561.	1025000.	3306.	3251.	4146.	1492.	437.
KANSAS	2258000.	1322.	3498.	82264.	1132.	1468000.	3267.	2112.	3190.	1105.	246.
KENTUCKY	3249000.	1233.	3035.	40395.	1148.	1707000.	2629.	3636.	3270.	648.	419.
LOUISIAN	3720000.	1284.	3002.	48523.	1810.	2429000.	2629.	2790.	3850.	810.	789.
MAINE	1029000.	834.	3119.	33215.	1342.	512000.	2823.	1670.	2437.	287.	135.
MARYLAND	4055000.	1509.	4145.	10577.	1141.	3080000.	3762.	3781.	3788.	955.	832.
MASSACHU	5787000.	5441.	4260.	8257.	2315.	4894000.	3873.	8715.	11121.	1967.	1853.
MICHIGAN	9592000.	6959.	4126.	58216.	3041.	6658000.	3697.	17242.	15505.	3052.	8448.
MINNESOT	3895000.	2303.	3748.	84068.	2011.	2551000.	3355.	4620.	5974.	1563.	224.
MISSISSI	2263000.	963.	2547.	47716.	1597.	1002000.	2062.	1635.	3001.	563.	8.
MISSOURI	4753000.	2761.	3658.	69686.	1002.	3324000.	3248.	5895.	7097.	1395.	4623.
MONTANA	719000.	351.	3327.	147138.	736.	375000.	2926.	312.	1177.	379.	225.
NEBRASKA	1525000.	690.	3721.	77227.	1415.	937000.	3290.	1150.	2699.	1415.	290.
NEVADA	527000.	77.	4269.	110540.	65.	411000.	4021.	134.	374.	65.	6.
NEW HAMP	771000.	694.	3475.	9304.	524.	434000.	3255.	932.	1522.	257.	123.
NEW JERS	7367000.	6575.	4457.	7836.	2703.	6497000.	3964.	12738.	15097.	2659.	4320.
NEW MEXI	1065000.	272.	2985.	121666.	298.	711000.	2671.	204.	894.	214.	1.
NEW YORK	18365000.	14663.	4702.	49576.	5913.	15816000.	4133.	25247.	43733.	5479.	5009.
N. CAROL	5214000.	3322.	3138.	52586.	4442.	2316000.	2661.	6606.	8742.	2469.	70.
N. DAKOT	632000.	152.	3157.	70665.	367.	275000.	2736.	113.	710.	367.	12.
OHIO	10783000.	8182.	3949.	41222.	3672.	8084000.	3476.	20435.	16200.	3246.	2725.
OKLAHOMA	2634000.	962.	3232.	69919.	857.	1775000.	2842.	1346.	3048.	796.	174.
OREGON	2142000.	1952.	3600.	96981.	2365.	1575000.	3333.	2060.	4723.	747.	630.
PENNSYLV	11925000.	8580.	3891.	45333.	4694.	8553000.	3408.	14277.	19439.	3871.	3247.
RHODE IS	969000.	1314.	3435.	1214.	631.	835000.	3601.	1351.	2725.	631.	71.
S. CAROL	2665000.	1141.	2861.	31055.	2136.	1261000.	2395.	3030.	3735.	813.	91.
S. DAKOT	679000.	192.	3153.	77047.	397.	302000.	2911.	171.	880.	377.	43.
TENNESSE	4031000.	2219.	3019.	42246.	1940.	2354000.	2586.	4921.	5306.	1065.	151.
TEXAS	11649000.	4672.	3419.	267339.	3082.	9168000.	3013.	10922.	13938.	3082.	102.
UTAH	1126000.	440.	3057.	84916.	316.	879000.	2802.	778.	1212.	279.	15.
VERMONT	462000.	491.	3331.	9609.	367.	147000.	3033.	515.	975.	144.	145.
VIRGINIA	4764000.	1813.	3558.	40817.	2700.	3064000.	3062.	4168.	5265.	960.	1351.
WASHINGT	3443000.	2471.	3964.	68192.	2373.	2000000.	3646.	3764.	5370.	1014.	1243.
W. VIRGI	1781000.	703.	2970.	24181.	1363.	683000.	2450.	2170.	2362.	775.	426.
WISCONSI	4521000.	3694.	3632.	56154.	3336.	2954000.	3376.	7014.	8490.	24[illegible]	293.
WYOMING	345000.	114.	3545.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

STATE	VAR 15	VAR 16	VAR 17	VAR 18	VAR 19	VAR 20	VAR 21	VAR 22	VAR 23	VAR 24	VAR 25
ALABAMA	1127.	0.	233.	268.	720.	369.	61.	849.	54.	173.	528.
ALASKA	8.	0.	36.	5.	2.	32.	0.	662.	27.	106.	222.
ARIZONA	1546.	53.	119.	413.	69.	11.	76.	338.	8.	19.	422.
ARKANSAS	756.	0.	209.	122.	163.	51.	7.	456.	29.	80.	136.
CALIFORN	11683.	217.	672.	1525.	111.	307.	1096.	1511.	158.	317.	636.
COLORADO	1443.	271.	218.	993.	240.	52.	19.	633.	38.	76.	155.
CONNECTI	926.	0.	143.	5.	14.	187.	6.	703.	49.	421.	389.
DELAWARE	362.	0.	29.	0.	56.	179.	0.	96.	14.	27.	5.
DISTRICT	1750.	0.	1.	0.	0.	0.	0.	57.	0.	0.	18.
FLORIDA	3135.	0.	534.	662.	236.	265.	235.	1046.	37.	87.	1537.
GEORGIA	1550.	0.	444.	190.	1743.	220.	38.	961.	38.	96.	317.
HAWAII	151.	0.	37.	45.	79.	93.	21.	179.	28.	53.	120.
IDAHO	245.	88.	119.	439.	106.	53.	6.	673.	17.	30.	169.
ILLINOIS	8216.	57.	1279.	295.	*****	653.	9.	1202.	85.	254.	1241.
INDIANA	4569.	23.	443.	98.	6757.	1073.	3.	1179.	60.	200.	1980.
IOWA	1313.	170.	552.	930.	*****	107.	5.	1039.	42.	161.	241.
KANSAS	1641.	128.	477.	1113.	1954.	37.	7.	942.	14.	26.	333.
KENTUCKY	1462.	0.	259.	110.	1174.	122.	7.	835.	37.	128.	1816.
LOUISIAN	1331.	0.	199.	251.	86.	997.	34.	749.	90.	219.	639.
MAINE	61.	0.	47.	5.	10.	153.	3.	833.	55.	252.	793.
MARYLAND	2321.	0.	374.	11.	165.	405.	22.	450.	38.	169.	417.
MASSACHU	1419.	0.	139.	6.	64.	142.	14.	1078.	147.	459.	775.
MICHIGAN	2521.	29.	1099.	80.	763.	739.	10.	1140.	46.	114.	695.
MINNESOT	2509.	40.	484.	183.	4281.	111.	7.	719.	31.	94.	560.
MISSISSI	799.	0.	228.	216.	291.	83.	36.	509.	31.	72.	226.
MISSOURI	1424.	35.	484.	313.	5639.	89.	8.	1071.	132.	420.	218.
MONTANA	259.	86.	163.	1062.	253.	36.	3.	491.	14.	26.	115.
NEBRASKA	614.	522.	487.	1631.	3838.	21.	7.	927.	13.	16.	80.
NEVADA	640.	0.	39.	253.	4.	11.	8.	261.	4.	4.	86.
NEW HAMP	33.	0.	36.	0.	11.	56.	0.	642.	42.	178.	382.
NEW JERS	2641.	0.	338.	6.	70.	391.	16.	641.	83.	270.	241.
NEW MEXI	854.	46.	82.	560.	53.	1.	24.	309.	10.	48.	86.
NEW YORK	9371.	0.	786.	25.	67.	519.	50.	1077.	144.	600.	757.
N. CAROL	2565.	0.	462.	30.	1227.	142.	12.	1488.	42.	87.	660.
N. DAKOT	357.	17.	225.	178.	263.	1.	2.	378.	11.	24.	55.
OHIO	5788.	28.	693.	88.	3240.	1128.	5.	1660.	115.	449.	3009.
OKLAHOMA	1592.	49.	371.	754.	250.	9.	12.	747.	20.	31.	911.
OREGON	1711.	34.	259.	431.	95.	138.	24.	643.	34.	100.	204.
PENNSYLV	5686.	3.	621.	29.	425.	1470.	13.	1544.	173.	689.	2084.
RHODE IS	473.	0.	18.	0.	16.	20.	1.	117.	23.	61.	79.
S. CAROL	772.	0.	255.	64.	327.	133.	24.	663.	56.	116.	398.
S. DAKOT	370.	51.	215.	726.	1931.	3.	1.	471.	8.	28.	33.
TENNESSE	1318.	0.	258.	78.	819.	445.	17.	723.	59.	155.	804.
TEXAS	11067.	225.	911.	2725.	1022.	1654.	136.	1924.	150.	295.	1421.
UTAH	596.	0.	78.	186.	31.	21.	7.	573.	19.	45.	260.
VERMONT	35.	0.	48.	6.	3.	6.	10.	706.	9.	15.	497.
VIRGINIA	1701.	0.	315.	116.	468.	326.	24.	1349.	83.	229.	587.
WASHINGT	897.	25.	325.	199.	74.	333.	43.	998.	35.	128.	222.
W. VIRGI	355.	0.	506.	11.	29.	61.	3.	747.	66.	326.	1925.
WISCONSI	2570.	7.	615.	77.	1931.	273.	20.	1642.	63.	279.	706.
WYOMING	215.	0.	81.	638.	46.	3.	0.	342.	13.	28.	12.
SAMOA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GUAM	0.	0.	1.	0.	0.	0.	0.	100.	0.	0.	0.
PUERTO R	369.	0.	1.	0.	0.	0.	0.	100.	0.	0.	0.
TRST TER	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
VIRGIN I	0.	0.	1.	0.	0.	0.	0.	100.	0.	0.	0.

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VARIABLE NUMBER  3                 VARIABLE NUMBER  4                 VARIABLE NUMBER  5

  1  CALIFORN    20468000.           1  NEW YORK        14663.           1  DISTRICT         5469.
  2  NEW YORK    18366000.           2  CALIFORN        13849.           2  CONNECTI         4735.
  3  PENNSYLV    11926000.           3  ILLINOIS      9[illegible]41.           3  NEW YORK         4712.
  4  TEXAS       11649000.           4  PENNSYLV      [illegible]6.           4  ILLINOIS         4462.
  5  ILLINOIS    11251000.           5  OHIO             8182.           5  NEW JERS         4457.
  6  OHIO        10783000.           6  MICHIGAN      [illegible]46.           6  CALIFORN         4333.
  7  MICHIGAN     9082000.           7  NEW JERS         6775.           7  DELAWARE         4292.
  8  NEW JERS     7367000.           8  MASSACHU         5441.           8  ALASKA           4270.
  9  FLORIDA      7259000.           9  TEXAS            4070.           9  NEVADA           4269.
 10  MASSACHU     5787000.          10  WISCONSI         3794.          10  MASSACHU         4260.
 11  INDIANA      5291000.          11  INDIANA          3349.          11  HAWAII           4216.
 12  N. CAROL     5214000.          12  N. CAROL         3322.          12  MARYLAND         4145.
 13  VIRGINIA     4764000.          13  CONNECTI         2876.          13  MICHIGAN         4126.
 14  MISSOURI     4753000.          14  MISSOURI         2760.          14  WASHINGT         3964.
 15  GEORGIA      4720000.          15  FLORIDA          2659.          15  OHIO             3949.
 16  WISCONSI     4520000.          16  GEORGIA          2329.          16  KANSAS           3898.
 17  MARYLAND     4056000.          17  MINNESOT         2318.          17  PENNSYLV         3891.
 18  TENNESSE     4031000.          18  WASHINGT         2247.          18  RHODE IS         3835.
 19  MINNESOT     3896000.          19  TENNESSE         2119.          19  INDIANA          3777.
 20  LOUISIAN     3720000.          20  OREGON           1955.          20  MINNESOT         3748.
 21  ALABAMA      3510000.          21  VIRGINIA         1813.          21  NEBRASKA         3721.
 22  WASHINGT     3443000.          22  ALABAMA          1637.          22  MISSOURI         3658.
 23  KENTUCKY     3299000.          23  MARYLAND         1539.          23  IOWA             3645.
 24  CONNECTI     3082000.          24  IOWA             1482.          24  WISCONSI         3632.
 25  IOWA         2883000.          25  RHODE IS         1314.          25  COLORADO         3621.
 26  S. CAROL     2665000.          26  LOUISIAN         1271.          26  OREGON           3620.
 27  OKLAHOMA     2634000.          27  KENTUCKY         1236.          27  VIRGINIA         3558.
 28  COLORADO     2357000.          28  S. CAROL         1141.          28  WYOMING          3545.
 29  MISSISSI     2263000.          29  ARKANSAS         1046.          29  NEW HAMP         3475.
 30  KANSAS       2258000.          30  KANSAS           1022.          30  FLORIDA          3455.
 31  OREGON       2182000.          31  OKLAHOMA          948.          31  TEXAS            3419.
 32  ARKANSAS     1978000.          32  MISSISSI          943.          32  ARIZONA          3349.
 33  ARIZONA      1945000.          33  COLORADO          938.          33  VERMONT          3331.
 34  W. VIRGI     1781000.          34  MAINE             834.          34  MONTANA          3327.
 35  NEBRASKA     1525000.          35  W. VIRGI          703.          35  GEORGIA          3289.
 36  UTAH         1126000.          36  NEBRASKA          696.          36  OKLAHOMA         3232.
 37  NEW MEXI     1065000.          37  NEW HAMP          694.          37  N. DAKOT         3157.
 38  MAINE        1029000.          38  ARIZONA           573.          38  S. DAKOT         3153.
 39  RHODE IS      968000.          39  UTAH              446.          39  N. CAROL         3138.
 40  HAWAII        809000.          40  IDAHO             432.          40  MAINE            3119.
 41  NEW HAMP      771000.          41  VERMONT           421.          41  IDAHO            3096.
 42  IDAHO         756000.          42  MONTANA           351.          42  UTAH             3057.
 43  DISTRICT      748000.          43  DELAWARE          286.          43  KENTUCKY         3035.
 44  MONTANA       719000.          44  NEW MEXI          275.          44  TENNESSE         3019.
 45  S. DAKOT      679000.          45  S. DAKOT          195.          45  LOUISIAN         3002.
 46  N. DAKOT      632000.          46  HAWAII            174.          46  NEW MEXI         2985.
 47  DELAWARE      565000.          47  N. DAKOT          152.          47  W. VIRGI         2970.
 48  NEVADA        527000.          48  ALASKA            119.          48  S. CAROL         2881.
 49  VERMONT       462000.          49  DISTRICT          115.          49  ALABAMA          2835.
 50  WYOMING       345000.          50  WYOMING           110.          50  ARKANSAS         2785.
 51  ALASKA        325000.          51  NEVADA             77.          51  MISSISSI         2547.
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VARIABLE NUMBER 6

 1  ALASKA        586412.
 2  TEXAS         267339.
 3  CALIFORN      158693.
 4  MONTANA       147138.
 5  NEW MEXI      121666.
 6  ARIZONA       113909.
 7  NEVADA        110540.
 8  COLORADO      104247.
 9  WYOMING        97914.
10  OREGON         96981.
11  UTAH           84916.
12  MINNESOT       84068.
13  IDAHO          83557.
14  KANSAS         82264.
15  NEBRASKA       77227.
16  S. DAKOT       77047.
17  N. DAKOT       70665.
18  OKLAHOMA       69919.
19  MISSOURI       69686.
20  WASHINGT       68192.
21  GEORGIA        58876.
22  FLORIDA        58560.
23  MICHIGAN       58216.
24  ILLINOIS       56400.
25  IOWA           56290.
26  WISCONSI       56154.
27  ARKANSAS       53104.
28  N. CAROL       52586.
29  ALABAMA        51609.
30  NEW YORK       49576.
31  LOUISIAN       48523.
32  MISSISSI       47716.
33  PENNSYLV       45333.
34  TENNESSE       42246.
35  OHIO           41222.
36  VIRGINIA       40817.
37  KENTUCKY       40395.
38  INDIANA        36291.
39  MAINE          33215.
40  S. CAROL       31055.
41  W. VIRGI       24181.
42  MARYLAND       10577.
43  VERMONT         9609.
44  NEW HAMP        9304.
45  MASSACHU        8257.
46  NEW JERS        7836.
47  HAWAII          6450.
48  CONNECTI        5009.
49  DELAWARE        2057.
50  RHODE IS        1214.
51  DISTRICT          67.


VARIABLE NUMBER 7

 1  NEW YORK        5913.
 2  CALIFORN        5844.
 3  PENNSYLV        4994.
 4  N. CAROL        4442.
 5  ILLINOIS        4013.
 6  TEXAS           3882.
 7  GEORGIA         3844.
 8  MICHIGAN        3841.
 9  OHIO            3672.
10  WISCONSI        3036.
11  ALABAMA         2935.
12  NEW JERS        2703.
13  VIRGINIA        2700.
14  WASHINGT        2373.
15  OREGON          2365.
16  FLORIDA         2244.
17  S. CAROL        2136.
18  MASSACHU        2015.
19  MINNESOT        2011.
20  TENNESSE        1940.
21  LOUISIAN        1810.
22  MISSOURI        1802.
23  INDIANA         1713.
24  MISSISSI        1597.
25  ARKANSAS        1587.
26  IOWA            1561.
27  NEBRASKA        1415.
28  W. VIRGI        1363.
29  MAINE           1342.
30  KENTUCKY        1148.
31  MARYLAND        1141.
32  KANSAS          1132.
33  COLORADO        1007.
34  CONNECTI         931.
35  OKLAHOMA         857.
36  IDAHO            836.
37  MONTANA          736.
38  RHODE IS         631.
39  NEW HAMP         534.
40  ARIZONA          419.
41  S. DAKOT         397.
42  N. DAKOT         367.
43  VERMONT          347.
44  UTAH             316.
45  NEW MEXI         298.
46  ALASKA           222.
47  WYOMING          174.
48  DELAWARE         155.
49  HAWAII           145.
50  NEVADA            65.
51  DISTRICT          10.


VARIABLE NUMBER 8

 1  CALIFORN    18402992.
 2  NEW YORK    15816000.
 3  ILLINOIS     9293000.
 4  TEXAS        9168000.
 5  PENNSYLV     8553000.
 6  OHIO         8094000.
 7  MICHIGAN     6658000.
 8  NEW JERS     6407000.
 9  FLORIDA      5703000.
10  MASSACHU     4894000.
11  INDIANA      3428000.
12  MISSOURI     3324000.
13  MARYLAND     3080000.
14  VIRGINIA     3064000.
15  WISCONSI     2954000.
16  GEORGIA      2798000.
17  MINNESOT     2561000.
18  LOUISIAN     2424000.
19  CONNECTI     2372000.
20  TENNESSE     2354000.
21  N. CAROL     2318000.
22  ALABAMA      2017000.
23  WASHINGT     2000000.
24  COLORADO     1804000.
25  OKLAHOMA     1773000.
26  KENTUCKY     1707000.
27  IOWA         1623000.
28  OREGON       1573000.
29  ARIZONA      1474000.
30  KANSAS       1468000.
31  S. CAROL     1261000.
32  MISSISSI     1002000.
33  ARKANSAS      972000.
34  NEBRASKA      937000.
35  UTAH          874000.
36  RHODE IS      835000.
37  DISTRICT      741000.
38  NEW MEXI      711000.
39  W. VIRGI      683000.
40  HAWAII        655000.
41  MAINE         512000.
42  IDAHO         490000.
43  NEW HAMP      434000.
44  NEVADA        411000.
45  DELAWARE      402000.
46  MONTANA       375000.
47  S. DAKOT      302000.
48  N. DAKOT      273000.
49  WYOMING       207000.
50  ALASKA        164000.
51  VERMONT       147000.
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    VARIABLE NUMBER  9                     VARIABLE NUMBER 10                     VARIABLE NUMBER 11

 1  DISTRICT        4405.          1  NEW YORK        25247.          1  NEW YORK        43733.
 2  CONNECTI        4327.          2  CALIFORN        23394.          2  CALIFORN        32448.
 3  NEW YORK        4133.          3  OHIO            21435.          3  ILLINOIS        14495.
 4  ALASKA          4130.          4  ILLINOIS        20216.          4  PENNSYLV        14419.
 5  NEVADA          4121.          5  PENNSYLV        19277.          5  OHIO            15770.
 6  ILLINOIS        4103.          6  MICHIGAN        17242.          6  MICHIGAN        15515.
 7  CALIFORN        3996.          7  NEW JERS        12738.          7  NEW JERS        13947.
 8  NEW JERS        3944.          8  TEXAS           10422.          8  TEXAS           13938.
 9  MASSACHU        3873.          9  INDIANA         10318.          9  MASSACHU        11121.
10  MARYLAND        3742.         10  DELAWARE         9580.         10  N. CAROL         8742.
11  MICHIGAN        3647.         11  MASSACHU         8715.         11  FLORIDA          8522.
12  WASHINGT        3646.         12  WISCONSI         7114.         12  WISCONSI         8440.
13  RHODE IS        3591.         13  N. CAROL         6606.         13  GEORGIA          7442.
14  HAWAII          3580.         14  CONNECTI         6340.         14  INDIANA          7429.
15  OHIO            3476.         15  MISSOURI         5545.         15  MISSOURI         7047.
16  INDIANA         3423.         16  TENNESSE         4921.         16  CONNECTI         5946.
17  PENNSYLV        3408.         17  GEORGIA          4694.         17  MINNESOT         5474.
18  WISCONSI        3375.         18  MINNESOT         4530.         18  WASHINGT         5370.
19  MINNESOT        3355.         19  VIRGINIA         4049.         19  TENNESSE         5316.
20  OREGON          3333.         20  MARYLAND         3781.         20  VIRGINIA         5245.
21  COLORADO        3324.         21  WASHINGT         3744.         21  ALABAMA          5196.
22  IOWA            3316.         22  FLORIDA          3683.         22  OREGON           4723.
23  NEBRASKA        3270.         23  KENTUCKY         3536.         23  IOWA             4146.
24  KANSAS          3267.         24  ALABAMA          3526.         24  LOUISIAN         3950.
25  NEW HAMP        3255.         25  IOWA             3251.         25  MARYLAND         3788.
26  MISSOURI        3248.         26  S. CAROL         3030.         26  S. CAROL         3735.
27  FLORIDA         3232.         27  LOUISIAN         2740.         27  KENTUCKY         3273.
28  WYOMING         3117.         28  W. VIRGI         2170.         28  KANSAS           3149.
29  VIRGINIA        3062.         29  KANSAS           2112.         29  ARKANSAS         3128.
30  ARIZONA         3057.         30  OREGON           2060.         30  OKLAHOMA         3048.
31  VERMONT         3033.         31  MISSISSI         1635.         31  MISSISSI         3001.
32  TEXAS           3013.         32  ARKANSAS         1554.         32  COLORADO         2971.
33  MONTANA         2926.         33  COLORADO         1359.         33  RHODE IS         2725.
34  OKLAHOMA        2842.         34  RHODE IS         1351.         34  NEBRASKA         2649.
35  MAINE           2823.         35  OKLAHOMA         1346.         35  MAINE            2437.
36  GEORGIA         2812.         36  NEBRASKA         1150.         36  W. VIRGI         2362.
37  S. DAKOT        2811.         37  MAINE            1070.         37  ARIZONA          1813.
38  UTAH            2802.         38  ARIZONA           995.         38  NEW HAMP         1522.
39  N. DAKOT        2736.         39  NEW HAMP          932.         39  IDAHO            1318.
40  IDAHO           2723.         40  UTAH              778.         40  UTAH             1212.
41  NEW MEXI        2671.         41  VERMONT           515.         41  MONTANA          1177.
42  N. CAROL        2661.         42  IDAHO             513.         42  VERMONT           975.
43  KENTUCKY        2629.         43  DISTRICT          393.         43  NEW MEXI          946.
44  LOUISIAN        2629.         44  HAWAII            326.         44  S. DAKOT          840.
45  TENNESSE        2546.         45  MONTANA           312.         45  HAWAII            734.
46  W. VIRGI        2450.         46  NEW MEXI          274.         46  N. DAKOT          710.
47  S. CAROL        2445.         47  S. DAKOT          171.         47  DISTRICT          546.
48  ALABAMA         2371.         48  NEVADA            134.         48  DELAWARE          453.
49  ARKANSAS        2316.         49  ALASKA            130.         49  WYOMING           419.
50  MISSISSI        2262.         50  N. DAKOT          113.         50  NEVADA            374.
51  DELAWARE         136.         51  WYOMING            46.         51  ALASKA            359.
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VARIABLE NUMBER 13                      VARIABLE N   ER 14                       VARIABLE NUMBER 15

 1  NEW YORK          5479.              1  CALIFORN          12454.              1  CALIFORN          11643.
 2  CALIFORN          4821.              2  MICHIGAN           8468.              2  TEXAS             11047.
 3  PENNSYLV          3471.              3  NEW YORK           5409.              3  NEW YORK           9371.
 4  ILLINOIS          3406.              4  MISSOURI           4623.              4  ILLINOIS           8216.
 5  OHIO              3246.              5  NEW JERS           4320.              5  PENNSYLV           5886.
 6  TEXAS             3042.              6  PENNSYLV           3247.              6  OHIO               5784.
 7  MICHIGAN          3032.              7  OHIO               2726.              7  INDIANA            4589.
 8  NEW JERS          2659.              8  MASSACHU           1803.              8  FLORIDA            3135.
 9  N. CAROL          2484.              9  CONNECTI           1382.              9  NEW JERS           2641.
10  WISCONSI          2467.             10  VIRGINIA           1351.             10  WISCONSI           2570.
11  MASSACHU          1907.             11  WASHINGT           1243.             11  MICHIGAN           2521.
12  GEORGIA           1812.             12  MARYLAND            892.             12  MINNESOT           2509.
13  MINNESOT          1563.             13  ILLINOIS            856.             13  MARYLAND           2321.
14  IOWA              1492.             14  LOUISIAN            780.             14  N. CAROL           2165.
15  INDIANA           1479.             15  COLORADO            649.             15  COLORADO           1993.
16  FLORIDA           1424.             16  OREGON              639.             16  KENTUCKY           1982.
17  NEBRASKA          1415.             17  ALABAMA             630.             17  MISSOURI           1824.
18  MISSOURI          1395.             18  INDIANA             545.             18  DISTRICT           1760.
19  KANSAS            1105.             19  GEORGIA             516.             19  VIRGINIA           1741.
20  TENNESSE          1065.             20  IOWA                437.             20  OREGON             1711.
21  WASHINGT          1014.             21  W. VIRGI            426.             21  GEORGIA            1650.
22  VIRGINIA           960.             22  FLORIDA             420.             22  KANSAS             1641.
23  MARYLAND           955.             23  KENTUCKY            419.             23  OKLAHOMA           1592.
24  S. CAROL           913.             24  NEBRASKA            290.             24  ARIZONA            1546.
25  CONNECTI           889.             25  WISCONSI            283.             25  MASSACHU           1414.
26  ALABAMA            869.             26  KANSAS              246.             26  TENNESSE           1318.
27  COLORADO           841.             27  MINNESOT            228.             27  IOWA               1313.
28  LOUISIAN           810.             28  MONTANA             225.             28  ALABAMA            1127.
29  OKLAHOMA           796.             29  OKLAHOMA            174.             29  LOUISIAN           1031.
30  W. VIRGI           775.             30  ARKANSAS            165.             30  WASHINGT            997.
31  OREGON             747.             31  TENNESSE            151.             31  UTAH                896.
32  KENTUCKY           648.             32  IDAHO               147.             32  NEW MEXI            884.
33  RHODE IS           631.             33  VERMONT             145.             33  NEVADA              840.
34  MISSISSI           563.             34  MAINE               135.             34  MISSISSI            799.
35  ARKANSAS           548.             35  NEW HAMP            123.             35  S. CAROL            772.
36  IDAHO              426.             36  TEXAS               108.             36  ARKANSAS            755.
37  MONTANA            379.             37  S. CAROL             91.             37  CONNECTI            626.
38  S. DAKOT           377.             38  RHODE IS             71.             38  NEBRASKA            614.
39  N. DAKOT           367.             39  N. CAROL             70.             39  RHODE IS            473.
40  ARIZONA            348.             40  HAWAII               49.             40  S. DAKOT            370.
41  MAINE              287.             41  S. DAKOT             43.             41  N. DAKOT            367.
42  UTAH               279.             42  WYOMING              42.             42  DELAWARE            362.
43  NEW HAMP           257.             43  DELAWARE             21.             43  W. VIRGI            355.
44  NEW MEXI           214.             44  ALASKA               21.             44  MONTANA             250.
45  DELAWARE           155.             45  ARIZONA              16.             45  IDAHO               245.
46  HAWAII             145.             46  UTAH                 15.             46  WYOMING             215.
47  VERMONT            144.             47  N. DAKOT             12.             47  HAWAII              151.
48  ALASKA             138.             48  MISSISSI              8.             48  MAINE                61.
49  WYOMING            129.             49  NEVADA                6.             49  VERMONT              35.
50  NEVADA              65.             50  NEW MEXI              1.             50  NEW HAMP             33.
51  DISTRICT            19.             51  DISTRICT              0.             51  ALASKA                8.
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VARIABLE NUMBER 16                  VARIABLE N[illegible]ER 17              VARIABLE NUMBER 18

  1  NEBRASKA       322.            1  ILLINOIS      1270.            1  TEXAS         2725.
  2  COLORADO       271.            2  MICHIGAN      1099.            2  NEBRASKA      1631.
  3  TEXAS          225.            3  TEXAS          911.            3  CALIFORN      1525.
  4  CALIFORN       217.            4  NEW YORK       786.            4  KANSAS        1113.
  5  IOWA           170.            5  OHIO           693.            5  MONTANA       1062.
  6  KANSAS         128.            6  CALIFORN       672.            6  COLORADO       993.
  7  IDAHO           88.            7  PENNSYLV       621.            7  IOWA           930.
  8  MONTANA         86.            8  WISCONSI       615.            8  OKLAHOMA       754.
  9  ILLINOIS        57.            9  IOWA           552.            9  S. DAKOT       726.
 10  ARIZONA         53.           10  FLORIDA        534.           10  FLORIDA        662.
 11  S. DAKOT        51.           11  W. VIRGI       506.           11  WYOMING        638.
 12  OKLAHOMA        49.           12  NEBRASKA       487.           12  NEW MEXI       560.
 13  NEW MEXI        46.           13  MISSOURI       484.           13  IDAHO          439.
 14  MINNESOT        40.           14  MINNESOT       484.           14  OREGON         431.
 15  MISSOURI        35.           15  KANSAS         477.           15  ARIZONA        413.
 16  OREGON          34.           16  N. CAROL       462.           16  MISSOURI       313.
 17  MICHIGAN        29.           17  GEORGIA        444.           17  ILLINOIS       295.
 18  OHIO            28.           18  INDIANA        443.           18  ALABAMA        258.
 19  WASHINGT        25.           19  MARYLAND       374.           19  NEVADA         253.
 20  INDIANA         23.           20  OKLAHOMA       371.           20  LOUISIAN       251.
 21  N. DAKOT        17.           21  NEW JERS       338.           21  MISSISSI       216.
 22  WISCONSI         7.           22  WASHINGT       325.           22  WASHINGT       199.
 23  PENNSYLV         3.           23  VIRGINIA       315.           23  GEORGIA        190.
 24  FLORIDA          0.           24  KENTUCKY       259.           24  UTAH           186.
 25  MISSISSI         0.           25  TENNESSE       258.           25  MINNESOT       183.
 26  GEORGIA          0.           26  S. CAROL       255.           26  N. DAKOT       178.
 27  HAWAII           0.           27  OREGON         2 0.           27  ARKANSAS       122.
 28  ARKANSAS         0.           28  ALABAMA        233.           28  VIRGINIA       116.
 29  NEVADA           0.           29  MISSISSI       228.           29  KENTUCKY       110.
 30  NEW HAMP         0.           30  N. DAKOT       225.           30  INDIANA         98.
 31  NEW JERS         0.           31  COLORADO       218.           31  OHIO            88.
 32  ALASKA           0.           32  S. DAKOT       215.           32  MICHIGAN        80.
 33  NEW YORK         0.           33  ARKANSAS       209.           33  TENNESSE        78.
 34  N. CAROL         0.           34  LOUISIAN       190.           34  WISCONSI        77.
 35  ALABAMA          0.           35  MONTANA        163.           35  S. CAROL        64.
 36  CONNECTI         0.           36  CONNECTI       143.           36  HAWAII          45.
 37  DELAWARE         0.           37  MASSACHU       130.           37  N. CAROL        30.
 38  KENTUCKY         0.           38  ARIZONA        119.           38  PENNSYLV        29.
 39  LOUISIAN         0.           39  IDAHO          119.           39  NEW YORK        25.
 40  RHODE IS         0.           40  NEW MEXI        82.           40  MARYLAND        11.
 41  S. CAROL         0.           41  WYOMING         81.           41  W. VIRGI        11.
 42  MAINE            0.           42  UTAH            78.           42  VERMONT          6.
 43  TENNESSE         0.           43  VERMONT         48.           43  NEW JERS         6.
 44  MARYLAND         0.           44  MAINE           47.           44  MASSACHU         6.
 45  UTAH             0.           45  NEVADA          39.           45  MAINE            5.
 46  VERMONT          0.           46  HAWAII          37.           46  ALASKA           5.
 47  VIRGINIA         0.           47  ALASKA          36.           47  CONNECTI         5.
 48  MASSACHU         0.           48  NEW HAMP        36.           48  RHODE IS         0.
 49  W. VIRGI         0.           49  DELAWARE        20.           49  DELAWARE         0.
 50  DISTRICT         0.           50  RHODE IS        18.           50  DISTRICT         0.
 51  WYOMING          0.           51  DISTRICT         1.           51  NEW HAMP         0.
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VARIABLE NUMBER 19

 1  IOWA          23932.
 2  ILLINOIS      11218.
 3  INDIANA        6757.
 4  MISSOURI       5639.
 5  MINNESOT       4281.
 6  NEBRASKA       3438.
 7  OHIO           3240.
 8  KANSAS         1954.
 9  S. DAKOT       1931.
10  WISCONSI       1931.
11  GEORGIA        1743.
12  N. CAROL       1227.
13  KENTUCKY       1174.
14  TEXAS          1022.
15  TENNESSE        819.
16  MICHIGAN        763.
17  ALABAMA         720.
18  VIRGINIA        468.
19  PENNSYLV        425.
20  S. CAROL        327.
21  MISSISSI        2[illegible]1.
22  N. DAKOT        263.
23  MONTANA         253.
24  OKLAHOMA        250.
25  COLORADO        240.
26  FLORIDA         236.
27  MARYLAND        165.
28  ARKANSAS        163.
29  CALIFORN        111.
30  IDAHO           106.
31  OREGON           95.
32  LOUISIAN         86.
33  HAWAII           79.
34  WASHINGT         74.
35  NEW JERS         70.
36  NEW YORK         67.
37  MASSACHU         64.
38  ARIZONA          60.
39  DELAWARE         56.
40  NEW MEXI         53.
41  WYOMING          46.
42  UTAH             31.
43  W. VIRGI         29.
44  RHODE IS         16.
45  CONNECTI         14.
46  NEW HAMP         11.
47  MAINE            10.
48  NEVADA            4.
49  VERMONT           3.
50  ALASKA            2.
51  DISTRICT          0.
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VARIABLE [illegible]BER 20

 1  TEXAS          1654.
 2  PENNSYLV       1470.
 3  OHIO           1128.
 4  INDIANA        1073.
 5  LOUISIAN        999.
 6  MICHIGAN        749.
 7  ILLINOIS        653.
 8  W. VIRGI        610.
 9  NEW YORK        519.
10  TENNESSE        445.
11  MARYLAND        405.
12  NEW JERS        341.
13  ALABAMA         340.
14  WASHINGT        333.
15  VIRGINIA        326.
16  CALIFORN        307.
17  WISCONSI        273.
18  FLORIDA         265.
19  GEORGIA         220.
20  CONNECTI        187.
21  DELAWARE        179.
22  MAINE           153.
23  MASSACHU        142.
24  N. CAROL        142.
25  OREGON          138.
26  S. CAROL        133.
27  KENTUCKY        122.
28  MINNESOT        111.
29  IOWA            107.
30  HAWAII           93.
31  MISSOURI         89.
32  MISSISSI         63.
33  NEW HAMP         55.
34  IDAHO            [illegible]
35  COLORADO         [illegible]
36  ARKANSAS         51.
37  KANSAS           37.
38  MONTANA          36.
39  ALASKA           32.
40  NEBRASKA         21.
41  UTAH             21.
42  RHODE IS         20.
43  ARIZONA          11.
44  NEVADA           11.
45  OKLAHOMA          9.
46  VERMONT           6.
47  WYOMING           3.
48  S. DAKOT          3.
49  NEW MEXI          1.
50  N. DAKOT          1.
51  DISTRICT          0.
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VARIABLE NUMBER 21

 1  CALIFORN       1[illegible]96.
 2  FLORIDA         235.
 3  TEXAS           135.
 4  ARIZONA          76.
 5  ALABAMA          61.
 6  NEW YORK         50.
 7  WASHINGT         43.
 8  GEORGIA          36.
 9  MISSISSI         35.
10  LOUISIAN         34.
11  S. CAROL         24.
12  NEW MEXI         24.
13  VIRGINIA         24.
14  OREGON           24.
15  MARYLAND         22.
16  HAWAII           21.
17  WISCONSI         20.
18  COLORADO         19.
19  TENNESSE         17.
20  NEW JERS         16.
21  MASSACHU         14.
22  PENNSYLV         13.
23  N. CAROL         12.
24  OKLAHOMA         12.
25  VERMONT          10.
26  MICHIGAN         10.
27  ILLINOIS          9.
28  MISSOURI          8.
29  NEVADA            8.
30  ARKANSAS          7.
31  UTAH              7.
32  MINNESOT          7.
33  KANSAS            7.
34  KENTUCKY          7.
35  NEBRASKA          7.
36  IDAHO             6.
37  CONNECTI          6.
38  OHIO              5.
39  IOWA              5.
40  INDIANA           3.
41  MAINE             3.
42  W. VIRGI          3.
43  MONTANA           3.
44  N. DAKOT          2.
45  RHODE IS          1.
46  S. DAKOT          1.
47  DISTRICT          0.
48  ALASKA            0.
49  DELAWARE          0.
50  NEW HAMP          0.
51  WYOMING           0.
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VARIABLE NUMBER 22                        VARIABLE NUMBER 23                        VARIABLE NUMBER 24

 1  TEXAS         1924.                    1  NEW YORK      184.                    1  PENNSYLV      649.
 2  OHIO          1669.                    2  PENNSYLV      173.                    2  NEW YORK      630.
 3  WISCONSI      1642.                    3  CALIFORN      158.                    3  MASSACHU      459.
 4  PENNSYLV      1544.                    4  TEXAS         150.                    4  OHIO          449.
 5  CALIFORN      1511.                    5  MASSACHU      147.                    5  CONNECTI      421.
 6  N. CAROL      1448.                    6  MISSOURI      132.                    6  MISSOURI      420.
 7  VIRGINIA      1348.                    7  OHIO          115.                    7  W. VIRGI      326.
 8  ILLINOIS      1202.                    8  CONNECTI       99.                    8  CALIFORN      317.
 9  INDIANA       1179.                    9  LOUISIAN       90.                    9  TEXAS         295.
10  MICHIGAN      1140.                   10  ILLINOIS       85.                   10  WISCONSI      279.
11  MASSACHU      1078.                   11  NEW JERS       83.                   11  NEW JERS      270.
12  NEW YORK      1077.                   12  VIRGINIA       83.                   12  ILLINOIS      254.
13  MISSOURI      1071.                   13  W. VIRGI       66.                   13  MAINE         252.
14  FLORIDA       1046.                   14  WISCONSI       63.                   14  VIRGINIA      229.
15  IOWA          1039.                   15  INDIANA        60.                   15  LOUISIAN      219.
16  WASHINGT       998.                   16  TENNESSE       59.                   16  INDIANA       200.
17  GEORGIA        961.                   17  S. CAROL       56.                   17  NEW HAMP      178.
18  KANSAS         942.                   18  MAINE          55.                   18  ALABAMA       173.
19  NEBRASKA       927.                   19  ALABAMA        54.                   19  MARYLAND      169.
20  ALABAMA        849.                   20  MICHIGAN       46.                   20  IOWA          161.
21  KENTUCKY       835.                   21  N. CAROL       42.                   21  TENNESSE      155.
22  MAINE          813.                   22  IOWA           42.                   22  KENTUCKY      128.
23  LOUISIAN       749.                   23  NEW HAMP       42.                   23  WASHINGT      128.
24  W. VIRGI       747.                   24  GEORGIA        38.                   24  S. CAROL      116.
25  OKLAHOMA       747.                   25  COLORADO       38.                   25  MICHIGAN      114.
26  TENNESSE       723.                   26  MARYLAND       38.                   26  ALASKA        106.
27  MINNESOT       719.                   27  FLORIDA        37.                   27  OREGON        100.
28  VERMONT        706.                   28  KENTUCKY       37.                   28  GEORGIA        96.
29  CONNECTI       703.                   29  WASHINGT       35.                   29  MINNESOT       94.
30  IDAHO          673.                   30  OREGON         34.                   30  FLORIDA        87.
31  S. CAROL       663.                   31  MISSISSI       31.                   31  N. CAROL       87.
32  ALASKA         662.                   32  MINNESOT       31.                   32  ARKANSAS       80.
33  OREGON         643.                   33  ARKANSAS       29.                   33  COLORADO       76.
34  NEW HAMP       642.                   34  HAWAII         28.                   34  MISSISSI       72.
35  NEW JERS       641.                   35  ALASKA         27.                   35  RHODE IS       61.
36  COLORADO       623.                   36  RHODE IS       23.                   36  HAWAII         53.
37  UTAH           573.                   37  OKLAHOMA       20.                   37  NEW MEXI       48.
38  MISSISSI       509.                   38  UTAH           19.                   38  UTAH           45.
39  MONTANA        491.                   39  IDAHO          17.                   39  OKLAHOMA       31.
40  S. DAKOT       471.                   40  MONTANA        14.                   40  IDAHO          30.
41  ARKANSAS       456.                   41  KANSAS         14.                   41  S. DAKOT       28.
42  MARYLAND       450.                   42  DELAWARE       14.                   42  WYOMING        28.
43  N. DAKOT       378.                   43  NEBRASKA       13.                   43  DELAWARE       27.
44  WYOMING        342.                   44  WYOMING        13.                   44  KANSAS         26.
45  ARIZONA        338.                   45  N. DAKOT       11.                   45  MONTANA        26.
46  NEW MEXI       309.                   46  NEW MEXI       10.                   46  N. DAKOT       24.
47  NEVADA         261.                   47  VERMONT         9.                   47  ARIZONA        19.
48  HAWAII         179.                   48  S. DAKOT        8.                   48  NEBRASKA       16.
49  RHODE IS       117.                   49  ARIZONA         8.                   49  VERMONT        15.
50  DELAWARE        96.                   50  NEVADA          4.                   50  NEVADA          4.
51  DISTRICT        57.                   51  DISTRICT        0.                   51  DISTRICT        0.
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VARIABLE NUMBER 25

 1  OHIO           3109.
 2  PENNSYLV       2046.
 3  INDIANA        1940.
 4  W. VIRGI       1925.
 5  KENTUCKY       1416.
 6  FLORIDA        1437.
 7  TEXAS          1421.
 8  ILLINOIS       1241.
 9  OKLAHOMA        911.
10  TENNESSE        8 4.
11  MAINE           793.
12  MASSACHU        775.
13  NEW YORK        757.
14  WISCONSI        716.
15  MICHIGAN        665.
16  N. CAROL        660.
17  LOUISIAN        639.
18  CALIFORN        635.
19  VIRGINIA        597.
20  MINNESOT        560.
21  ALABAMA         524.
22  VERMONT         447.
23  ARIZONA         422.
24  MARYLAND        417.
25  S. CAROL        398.
26  CONNECTI        349.
27  NEW HAMP        342.
28  KANSAS          333.
29  GEORGIA         317.
30  UTAH            260.
31  NEW JERS        241.
32  IOWA            241.
33  MISSISSI        226.
34  WASHINGT        222.
35  ALASKA          222.
36  MISSOURI        218.
37  OREGON          214.
38  IDAHO           169.
39  COLORADO        155.
40  ARKANSAS        136.
41  HAWAII          120.
42  MONTANA         115.
43  NEW MEXI         96.
44  NEVADA           86.
45  NEBRASKA         80.
46  RHODE IS         79.
47  N. DAKOT         55.
48  S. DAKOT         33.
49  DISTRICT         18.
50  WYOMING          12.
51  DELAWARE          5.
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APPENDIX B

EXAMPLE OF COMPLETED WORK
FROM MANPOWER COORDINATOR

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PROGRAM DESCRIPTION

MONITORING AND DATA SUPPORT

I. Outline of Legislation:

A. Federal Water Pollution Control Act Amendments of 1972 (Water Bill), PL 92-500

Sec. 104(a)(5) - "in cooperation with States, and other Federal agencies establish, equip and maintain a Water Quality Surveillance System..."

Sec. 106(e)(1) - "...Administrator shall not make any (State Program) grant (unless the State makes provision to) monitor and to compile and analyze data on...the quality of navigable waters and...groundwaters...and...include it in the report required under Section 305..."

Parentheses Added

Sec. 303(e) - "Each State shall have a continuing planning process..."

Sec. 305(a) - "...Administrator shall prepare a report to be submitted...on January 1, 1974 which shall...describe the specific quality of all navigable waters...an inventory of all point sources of discharge..."

Sec. 305(b) - "...Each State shall...submit...each year (beginning January 1, 1975)...a description of the quality of all navigable waters...the extent to which...waters provide for...shellfish, fish and wildlife..."

Parentheses Added

Sec. 308(a) - "...Administrator shall require the...operator of any point source to...sample such effluents...in such manner as the Administrator shall prescribe...or his authorized representative...shall have right of entry..."

Sec. 314 - "Clean Lakes"

Title IV - "...any...discharge will comply with...provision..."

Underlining Added

B. Marine Protection, Research and Sanctuaries Act of 1972 (Ocean Dumping Bill), PL 92-532

Sec. 102(a) - Permits and criteria for ocean dumping
Sec. 107 - Surveillance and Enforcement - CG
Title II - Monitoring and Research - NOAA

II. Objective: To monitor the state of the Nation's waters in conformance with current legislative and executive determination.

III. Strategy:

A. To support States technically and financially in developing an adequate program, and effluent monitoring and surveillance.
B. To fulfill congressional directive and other reporting requirements.
C. To provide technical assistance and support as required.

IV. Roles and Responsibilities:

A. EPA Headquarters -
   1. Develops and promulgates regulations and guidelines relating to state monitoring and surveillance including minimum specifications for such a program.
   2. Reviews for approval State monitoring plans.
   3. Monitors compliance of states to approved plans.
   4. Carries out necessary intra- and interagency coordination.
   5. Evaluates adequacy of existing monitoring network including federal and state stations.
   6. Provides technical assistance as required.
   7. Provides information system support to Regions and States.
B. EPA Regions
   1. Works closely with and provides technical assistance to states in design and implementation of monitoring and surveillance programs encompassing all phases of such program including field, laboratory, data analysis, and information systems support.
   2. Designs and carries out monitoring surveys and operates routine monitoring stations.

3. Reviews and evaluates state monitoring programs as represented in states applications for program grants.
4. Performs annual mid-year review of state progress toward carrying out plans.

C. Other Federal Agencies

1. Consider need for environmental protection-oriented data when establishing and operating water sampling or monitoring programs.
2. Participate in monitoring surveys and routine monitoring networks.
3. Provide use of specialized equipment.

D. States

1. The primary responsibility for monitoring and surveillance rests on the States which, in accordance with regulations and guidelines promulgated by EPA Headquarters, must have monitoring programs to meet specific reporting needs in order to receive program grants.

E. The Private Sector

Industires, as well as municipalities, will be required to self-monitor effluent flows and characteristics.

F. Effects of Alternate Strategies

The basic strategy does not change with varying levels of funding. Only timing is affected.

FUNCTION: WATER MONITORING AND SURVEILLANCE

SUB-FUNCTION: WATER QUALITY SURVEY AND FIXED SAMPLING NETWORK OPERATIONS

FUNCTION:

Water Monitoring and Surveillance

Develop and implement or improve and expand water monitoring and surveillance programs to meet requirements of the Federal Water Pollution Control Act Amendments of 1972.

SUB-FUNCTION:

Water Quality Survey and Fixed Sampling Network Operations

a) designing studies to meet information needs, concerning current water quality, long-term trends, effects of effluents, etc. The same skills required to design and produce such studies are those needed to evaluate results.

b) development of sampling logistics, actual sampling including use and enforcement of use of acceptable sampling procedures, equipment maintenance, and making field determinations of certain parameters.

c) laboratory operation and maintenance, analysis for physical, chemical, and biological parameters, proper recording of results, and enforcement of an adequate quality control program.

FUNCTION: WATER MONITORING AND SURVEILLANCE

SUB-FUNCTION: DATA HANDLING AND PROCESSING

FUNCTION:

Water Monitoring and Surveillance

Develop and implement or improve and expand water monitoring and surveillance programs to meet requirements of the Federal Water Pollution Control Act Amendments of 1972.

SUB-FUNCTION:

Data Handling and Processing

Consists of reducing field and laboratory data to computer-readable form, and of storing, manipulating, and retrieving resulting data to meet other needs of subfunction 1 (p.3), and for other uses.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Network Operations

Occupational title: Water Quality Monitoring Survey/Network Director

Duties: On a case by case basis, design and implement water monitoring surveys. Design and implement fixed station networks in "representative areas."

Sources (education and experience): Degree in Aquatic Biology or Sanitary, Chemical, or Industrial engineering, or equivalent required. Experience: at least five years in direction of, or participation in, design and implementation of water monitoring surveys and fixed monitoring networks, including analysis of data therefrom. Sources: Water research teaching, or planning, municipal or industrial water pollution control area, etc.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Annual short course in field and lab techniques and in quality control procedures.
- Annual seminar re: advancing technology in sampling and laboratory devices.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Water Quality Information Analyst

Duties: Employs statistical and other techniques to analyze data and information resulting from water quality studies and fixed network sampling to explain relationships among physical, chemical, and biological aspects of stream quality. Participates in water monitoring survey and fixed network design and implementation.

Sources (education and experience): Degree in Aquatic Biology, Sanitary, Chemical, or Industrial Engineering or equivalent required.
Experience: at least three years in analysis of water resources or water pollution information analysis.
Sources: Water resource education field; Municipal or industrial water pollution control area.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Annual short course in field and lab techniques and in quality control procedures.
- Annual seminar re: advancing technology in sampling and laboratory devices.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Groundwater Monitoring Specialist

Duties: Participates in design of groundwater related segments of water quality surveys and fixed sampling networks. Participates in or directs field and laboratory activities relating to the subsurface environment.

Sources (education and experience): Degree in groundwater hydrology; mining; civil or sanitary engineering; geochemistry; or geology required.

Sources: academic institutions; earth resource or water pollution control activities.

Training requirements (e.g., update, upgrade, short courses):

Frequency/Duration:

- Orientation short course related to environmental protection and water pollution control.
- Orientation short course on "Water Quality Studies".
- Annual seminars in field and lab techniques.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Marine Monitoring Specialist (for coastal states)

Duties: Participates in design of marine related segments of water quality surveys and fixed sampling networks. Participates in or directs field and laboratory activities relating to the marine environment.

Sources (education and experience): Degree in physical or chemical oceanography, civil or sanitary engineering, estuarine dynamics and/or limnology also desirable.
Sources: Oceanographic institutions, colleges, and universities; estuarine and coastal experience also desirable.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Orientation short course related to environmental protection and water pollution control.
- Orientation short course on "Water Quality Studies".
- Annual seminars in field and lab techniques.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Aquatic Biologist

Duties: Participates in design of biological sampling programs; performs biological parameter analyses in field and lab; participates in analysis of biological data.

Sources (education and experience): Degree in Aquatic Biology (or related) or equivalent required.
Sources: Colleges or pollution study related areas.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Orientation short courses related to environmental protection and water pollution control.
- Orientation short course on "Water Quality Studies".
- Annual seminars in field and lab techniques.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Microbiologist/Bacteriologist

Duties: Participates in design of sampling programs for micro-biota; performs analyses of micro-biota in field and lab; participates in analysis of data relating to micro-biota.

Sources (education and experience): Degree in microbiology, bacteriology, or biochemistry required.
Sources: Colleges or pollution study related areas.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Orientation short course related to environmental protection and water pollution control.
- Orientation short course on "Water Quality Studies".
- Annual seminars in field and lab techniques.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Chemist

Duties: Participates in design of chemical sampling programs; performs field and lab chemical analyses.

Sources (education and experience): Degree in chemistry, biochemistry, or equivalent required.
Sources: Colleges or pollution study related areas.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Orientation short course related to environmental protection and water pollution control.
- Orientation short course on "Water Quality Studies".
- Annual seminars in field and lab techniques.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Laboratory Chief

Duties: Director, laboratory. Serves as administrative head of water quality laboratory: Directs activities or personnel engaged in testing or developing products, processes, or production equipment, or in making routine analyses of water quality parameters. Establishes and directs operation of laboratory control systems. Approves modifications of procedures. Assigns and schedules special projects. Verifies laboratory test reports. Compiles periodic and special reports on laboratory activities. Classifications are made according to particular science or branch of engineering concerned with, such as CHEMICAL-LABORATORY CHIEF.

Sources (education and experience): Degree in an environmental science required, plus minimum of five years experience or equivalent. Sources: Colleges and universities, water resource or water pollution related activities.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Annual short course in field and lab techniques, available devices, advancing technology.
- Frequent AQC seminars particularly relating to use of new equipment.
- Annual short course relating to "state-of-the-art".

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Water Quality Laboratory Technician

Duties: Performs routine chemical and biological parameter analyses. Tabulates and verifies bench card data. Participates in quality control procedures and follows other established lab procedures.

Sources (education and experience): Degree or associate degree in an environmental science desirable, or the equivalent in field or laboratory experience.

Sources: Colleges, universities and technical schools.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Orientation short course on EPA AQC techniques.
- Orientation short course on "Water Quality Studies".
- Annual seminar in lab and field determination techniques.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Water Quality Survey and Fixed Sampling Network Operations

Occupational title: Aquatic Sampler

Duties: Following strict quality control procedures and time schedules, takes water samples utilizing specialized sampling devices. Operates boats or other sampling platforms as required.

Sources (education and experience): High school diploma and/or other courses in environmental sciences desirable.
Sources: High schools, technical education center or schools, etc.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Orientation short course in water sampling techniques.
- Annual seminar in sampling devices.
- Orientation short course on methods for making elementary field determinations.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Data Handling, and Processing

Occupational title: Data Support Director

Duties: Directs data reduction and automation activities. Provides hardware and software for data storage, retrieval, manipulation, and reporting. Supports needs of study design and data analysis personnel.

Sources (education and experience): Strong background, including experience, in computer sciences or operations, statistics and data evaluation required.
Sources: Academic institutions, computer training schools, environment related computer activities.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:

- Quarterly seminars in the "state-of-the-art".
- Orientation short course on "Water Quality Studies".
- Annual short course in modeling techniques and new computer applications.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Data Handling, and Processing

Occupational title: Computer Systems Analyst/Programmer

Duties: Converts scientific, engineering and other technical problem formulations to formulae processable by computer. Reviews results of computer runs with interested technical personnel. Develops new subroutines for a specific area of application or expands on applicability of current general programs to simplify statement, programming, or coding of future problems. May supervise other programming personnel. May specialize in single area of application.

Sources (education and experience): Background and experience in computer sciences and/or operations, mathematics, and statistics required. Sources: Academic institutions, computer training schools, environment-related computer activities.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:
- Quarterly seminars in the "state-of-the-art".
- Orientation short course on "Water Quality Studies".
- Annual short course in modeling techniques and new computer applications.

FORM 4: FUNCTIONAL OCCUPATIONAL DEFINITION

Program: Monitoring and Data Support Division

Function: Water Monitoring and Surveillance

Sub-function: Data Handling, and Processing

Occupational title: Data Processing Clerk

Duties: Participates in elementary data reduction, including data tabulations, keypunching and/or verifying. Keeps records of documents handled, computer run logs, etc.

Sources (education and experience): High school diploma and training in unit records or peripheral equipment operations required. Sources: High schools, computer or keypunching schools.

Training requirements (e.g., update, upgrade, short courses):
Frequency/Duration:
- Annual short course in new equipment and techniques.
- Orientation seminar on importance of role in enforcement, etc.

EXHIBIT 4

Sheet 1 of 2

WORKLOAD ANALYSIS SHEET

Program Monitoring & Data Support Division

Function Water Monitoring & Surveillance

Sub-Function Data Handling & Processing

Workload Indicator Total Pollution Sources Total Industries, Municipalities, Power Plants and Feedlots

Source of Workload Indicator EPA State Programs Data Base Variable #11

States	Workload Indicator Levels	States	Workload Indicator Levels
AL	5,196	NY	43,733
AK	359	CA	32,888
AZ	1,813	IL	19,905
AR	3,128	PA	19,439
CA	32,888	OH	16,200
CO	2,971	MI	15,505
CT	5,986	NJ	15,097
DE	553	TX	13,938
FL	8,522	MA	11,121
GA	7,432	NC	8,742
HI	734	FL	8,522
ID	1,338	WI	8,490
IL	19,905	GA	7,432
IN	7,420	IN	7,420
IA	4,146	MO	7,097
KS	3,190	CT	5,986
KY	3,270	MN	5,974
LA	3,850	WA	5,370
ME	2,437	TN	5,306
MD	3,788	VA	5,265
MA	11,121	AL	5,196
MI	15,505	OR	4,723
MN	5,974	IA	4,146
MS	3,001	LA	3,850
NO	7,087	MD	3,788
MT	1,177	SC	3,735
ME	2,699	KY	3,270
NV	3374	KS	3,190
NH	1,522	AK	3,128
NO	15,097	OK	3,048
NH	894	MI	3,001
NY	43,733	CO	2,971

EXHIBIT 4

Sheet 2 of 2

WORKLOAD ANALYSIS SHEET

Program Monitoring & Data Support Division

Function Water Monitoring & Surveillance

Sub-Function Data Handing & Processing

Workload Indicator Total Pollution Sources Total Industries, Municipalities, Power Plants & Feedlots

Source of Workload Indicator EPA State Programs Data Base Variable #11

States	Workload Indicator Levels	States	Workload Indicator Levels
NC	8,742	RI	2,725
ND	710	NE	2,699
OH	16,200	ME	2,437
OK	3,048	WV	2,362
OR	4,723	AZ	1,813
PA	19,439	NH	1,522
RI	2,725	ID	1,338
SC	3,735	UT	1,212
SD	880	MT	1,177
TN	5,306	VT	975
TX	13,938	NM	894
UT	1,212	SD	880
VT	975	HI	734
VA	5,265	ND	710
WA	5,370	DE	553
WV	2,362	WY	419
WI	8,490	NE	374
WY	419	AL	359
CZ		CZ	
DC	596	DC	596
GU		GU	
PR		PR	
VI		VI	

STAFFING GUIDE

Sheet 1 of [illegible]

Program Monitoring and Data Support Division

Function Water Monitoring & Surveillance

Sub-Function* Water Quality Survey & Fixed Sampling Network Operations

Workload Indicator Total Pollution Sources = Total Industries, Municipalities, Power Plants and Feedlots

Source of Workload Indicator EPA State Programs Data Base Variable #11

Occupational Title	Quantitative Personnel Requirements									
	Increments of Workload Indicator									
	48,000 24,000	24,000 12,000	12,000 6,000	6,000 3,000	3,000 2,000	2,000 1,000	1,000 0			
Director	1	1	1	1	1	1	1			
Water Quality Info. Analyst	3	3	3	1	1	1	1			
Aquatic Biologist	6	5	3	2	1	1	1			
Microbiologist	3	2	1	1	1	1	1			
Chemist	6	5	4	2	1	1	1			
Laboratory Chief	3	2	2	2	1	1	1			
Water Quality Lab Technician	10	8	6	4	2	2	2			
**Marine Monitoring Specialist	1	1								
Groundwater Monitoring Specialist	1	1								
Aquatic Sampler	12	10	8	5	3	3	3			
Secretary/Clerk Typist	2	2	2	1	1	1	1			
TOTAL STAFFING	48	40	30	19	12	12	12			

Prepared by L. C. Wastler

Approved __________

Date 3/20/73

*Based on 3 comprehensive basin surveys and a statewide fixed sampling network.

STAFFING GUIDE

Program Monitoring & Data Support Division

Sheet 1 of 1

Function Water Monitoring & Surveillance

Sub-Function Data Handling & Processing

Workload Indicator Total Pollution Sources = Total Industries, Municipalities, Power Plants and Feedlots

Source of Workload Indicator EPA State Programs Data Base Variable #11

Occupational Title	Quantitative Personnel Requirements Increments of Workload Indicator									
	48,000 24,000	24,000 12,000	12,000 6,000	6,000 3,000	3,000 2,000	2,000 1,000	1,000 0			
Data Support Director	1	1	1							
Computer Systems Analyst/Programmer	3	2	1	1	1	1	1			
Data Processing Clerk	6	4	3	2	2	1	1			
Secretary Clerk/Typist	2	1	1	1	1	1	1			
TOTAL STAFFING	12	8	6	4	4	3	3			

Prepared by L. C. Wastler

Date 3/20/73

Approved

MDSD

MANPOWER SUMMARY

Sheet 1 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Support

Sub-Function Data Handling & Processing

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Data Support Director	Computer Systems Analyst/Programmer	Data Processing Clerk	Secretary Clerk/Typist								Total
AL	5196		1	2	1								4
AK	359		1	1	1								3
AZ	1813	1	2	4	1								8
AR	3128		1	2	1								4
CA	32888	1	3	6	2								12
CO	2971		1	2	1								4
CT	5986		1	2	1								4
DE	553		1	1	1								3
FL	8522	1	1	3	1								6
GA	7432	1	1	3	1								6
HI	734		1	1	1								3
ID	1383	1	2	4	1								8
IL	19505	1	2	4	1								8
IN	7420	1	1	3	1								6
IA	4146		1	2	1								4

MDSD

MANPOWER SUMMARY

Sheet 2 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Support

Sub-Function Data Handling & Processing

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Data Support Director	Computer Systems Analyst/Programmer	Data Processing Clerk	Secretary/Clerk Typist								Total
KS	3190		1	2	1								4
KY	3270		1	2	1								4
LA	3850		1	2	1								4
ME	2437		1	2	1								4
MD	3788		1	2	1								4
MA	11121	1	1	3	1								6
MI	15505	1	2	4	1								8
MN	5974	1	1	3	1								6
MS	3001		1	2	1								4
MO	7097	1	1	3	1								6
MT	1177		1	1	1								3
NE	2699		1	2	1								4
NV	374		1	1	1								3
NH	1522		1	1	1								3
NJ	15097	1	2	4	1								8

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MANPOWER SUMMARY

Sheet 3 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Support

Sub-Function Data Handling & Processing

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Data Support Director	Computer Systems Analyst/Programmer	Data Processing Clerk	Secretary/Clerk Typist								Total
NM	894		1	1	1								3
NY	43733	1	3	6	2								12
NC	8742	1	1	3	1								6
ND	710		1	1	1								3
OH	16200	1	2	4	1								8
OK	3048		1	2	1								4
OR	4723		1	2	1								4
PA	19439	1	2	4	1								8
RI	2725		1	2	1								4
SC	3735		1	2	1								4
SD	880		1	1	1								3
TN	5306		1	2	1								4
TX	13938	1	2	4	1								8
UT	1212		1	1	1								3
VT	975		1	1	1								3

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MANPOWER SUMMARY

Sheet 4 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Support

Sub-Function Data Handling & Processing

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Data Support Director	Computer Systems Analyst/Programmer	Data Processing Clerk	Secretary/Clerk Typist								Total
VA	5265		1	2	1								4
WA	5370		1	2	1								4
WV	2362		1	2	1								4
WI	8490	1	1	3	1								6
WY	419		1	1	1								3
CZ	350(EST)		1	1	1								3
DC	596		1	1	1								3
GU	350(EST)		1	1	1								3
PR	2500(EST)		1	2	1								4
VI	350		1	1	1								3

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MANPOWER SUMMARY

Sheet 5 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Support

Sub-Function Water Quality Survey & Fixed Sampling Network Operations

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Director	Water Quality Information Analyst	Aquatic Biologist	Microbiologist	Chemist	Laboratory Chief	Water Quality Lab Technician	Marine Monitoring Specialist	Groundwater Monitoring Specialist	Aquatic Sampler	Secretary/Clerk Typist	Total
AL	5196	1	1	2	1	2	2	4			5	1	19
AK	359	1	1	1	1	1	1	2			3	1	12
AZ	1813	1	1	1	1	1	1	2			3	1	12
AR	3128	1	1	2	1	2	2	4			5	1	19
CA	32888	1	3	6	3	6	3	10	1	1	12	2	48
CO	2971	1	1	1	1	1	1	2			3	1	12
CT	5986	1	1	2	1	2	2	4			5	1	19
DE	553	1	1	1	1	1	1	2			3	1	12
FL	8522	1	3	3	1	4	2	6			8	2	30
GA	7432	1	3	3	1	4	2	6			8	2	30
HI	734	1	1	1	1	1	1	2			3	1	12
ID	1388	1	1	1	1	1	1	2			3	1	12
IL	19505	1	3	5	2	5	2	8	1	1	10	2	40
IN	7420	1	3	3	1	4	2	6			8	2	30
IA	4146	1	1	2	1	2	2	4			5	1	19

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MANPOWER SUMMARY

Sheet 6 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Suppor

Sub-Function Water Quality Survey & Fixed Sampling Network Operations

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Director	Water Quality Information Analyst	Aquatic Biologist	Microbiologist	Chemist	Laboratory Chief	Water Quality Lab Technician	Marine Monitoring Specialist	Groundwater Monitoring Specialist	Aquatic Sampler	Secretary/Clerk Typist	Total
KS	3190	1	1	2	1	2	2	4			5	1	19
KY	3270	1	1	2	1	2	2	4			5	1	19
LA	3850	1	1	2	1	2	2	4			5	1	19
ME	2437	1	1	1	1	1	1	2			3	1	12
MD	3788	1	1	2	1	2	2	4			5	1	19
MA	11121	1	3	5	2	5	2	8	1	1	10	2	40
MI	15505	1	3	5	2	5	2	8	1	1	10	2	40
MN	5974	1	1	2	1	2	2	4			5	1	19
MS	3001	1	1	1	1	1	1	2			3	1	12
MO	7097	1	3	3	1	4	2	6			8	2	30
MT	1177	1	1	1	1	1	1	2			3	1	12
NE	2699	1	1	1	1	1	1	2			3	1	12
NV	374	1	1	1	1	1	1	2			3	1	12
NH	1522	1	1	1	1	1	1	2			3	1	12
NJ	15097	1	3	5	2	5	2	8	1	1	10	2	40

MDSD

MANPOWER SUMMARY

Sheet 7 of 8

Function Water Monitoring & Surveillance

Sub-Function Water Quality Survey & Fixed Sampling Network Operations

Workload Indicator Variable 11 = total Pollution Sources

Program Monitoring & Data Support

Prepared by L. C. Wastler

Date 3/20/73

State or Territory	Level of Work-Load	OCCUPATION											
		Director	Water Quality Information Analyst	Aquatic Biologist	Microbiologist	Chemist	Laboratory Chief	Water Quality Lab Technician	Marine Monitoring Specialist	Groundwater Monitoring Specialist	Aquatic Sampler	Secretary/Clerk Typist	Total
NM	894	1	1	1	1	1	1	2			3	1	12
NY	43733	1	3	6	3	6	3	10	1	1	12	2	48
NC	8742	1	3	3	1	4	2	6			8	2	30
ND	710	1	1	1	1	1	1	2			3	1	12
OH	16200	1	3	5	2	5	2	8	1	1	10	2	40
OK	3048	1	1	2	1	2	2	4			5	1	19
OR	4723	1	1	2	1	2	2	4			5	1	19
PA	19439	1	3	5	2	5	2	8	1	1	10	2	40
RI	2725	1	1	1	1	1	1	2			3	1	12
SC	3735	1	1	2	1	2	2	4			5	1	19
SD	880	1	1	1	1	1	1	2			3	1	12
TN	5306	1	1	2	1	2	2	4			5	1	19
TX	13938	1	3	5	2	5	2	8	1	1	10	2	40
UT	1212	1	1	1	1	1	1	2			3	1	12
VT	975	1	1	1	1	1	1	2			3	1	12

MDSD

MANPOWER SUMMARY

Sheet 8 of 8

Function Water Monitoring & Surveillance

Program Monitoring & Data Suppor

Sub-Function Water Quality Survey & Fixed Sampling Network Operations

Prepared by L. C. Wastler

Workload Indicator Variable 11 = total Pollution Sources

Date 3/20/73

State or Terri-tory	Level of Work-Load	OCCUPATION											
		Director	Water Quality Information Analyst	Aquatic Biologist	Microbiologist	Chemist	Laboratory Chief	Water Quality Lab Technician	Marine Monitoring Specialist	Groundwater Monitoring Specialist	Aquatic Sampler	Secretary/Clerk Typist	Total
VA	5265	1	1	2	1	2	2	4			5	1	19
WA	5370	1	1	2	1	2	2	4			5	1	19
WV	2362	1	1	1	1	1	1	2			3	1	12
WI	8490	1	3	3	1	4	2	6			8	2	30
WY	419	1	1	1	1	1	1	2			3	1	12
CZ	350(EST)	1	1	1	1	1	1	2			3	1	12
DC	596	1	1	1	1	1	1	2			3	1	12
GU	350(EST)	1	1	1	1	1	1	2			3	1	12
PR	2500(EST)	1	1	1	1	1	1	2			3	1	12
VI	350	1	1	1	1	1	1	2			3	1	12

APPENDIX C

MANPOWER REQUIREMENTS FOR STATE WATER POLLUTION CONTROL AGENCIES

INTRODUCTION

The following table presents manpower requirements for all fifty state water pollution control agencies, by function. These data were derived from information provided by manpower. coordinators in the headquarters program offices. For a complete description of how these numbers were derived, see Section 3.0 of the text of this report.

MANPOWER REQUIREMENTS

Function* State	Water Monitoring and Surveillance	Research and Monitoring	Review of Plans & Specs for Municipal Waste Water Systems	Plant Inspection for Municipal Waste Water System	Oil and Hazardous Substance Spill Prevention and Response	Manpower Development
AL	24	2	3	5	3	8
AK	15	2	1	1	7	3
AZ	20	2	1	2	3	5
AR	24	2	2	3	3	8
CA	60	3	6	15	20	13
CO	16	2	2	3	7	6
CT	24	2	2	6	5	8
DE	15	2	1	1	5	3
FL	36	2	5	10	5	9
GA	36	2	4	7	3	9
HI	15	2	1	1	5	3
ID	20	2	1	2	5	5
IL	48	3	9	15	20	11
IN	36	2	4	7	14	9
IA	24	2	4	6	3	8
KS	24	2	4	7	7	8
KY	24	2	2	4	5	8
LA	24	2	2	4	7	8

*This represents all functions for which data are available. It does not represent all state agency functions.

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Function State	Water Monitoring and Surveillance	Research and Monitoring	Review of Plans & Specs for Municipal Waste Water Systems	Plant Inspection for Municipal Waste Water System	Oil and Hazardous Substance Spill Prevention and Respons	Manpower Development
ME	16	2	1	1	5	6
MD	24	2	3	4	10	8
MA	46	3	2	4	5	9
MI	48	3	7	11	20	11
MN	26	2	4	6	14	8
MS	16	2	3	4	3	6
MD	36	2	4	6	5	9
MT	15	2	1	2	5	5
NE	16	2	4	5	5	6
NV	15	2	1	1	3	3
NH	15	2	1	1	3	5
NJ	48	3	4	8	5	11
NM	15	2	1	2	3	3
NY	60	3	6	13	14	13
NC	36	2	8	17	5	9
ND	15	2	2	2	3	3
OH	48	3	6	13	14	11
OK	24	2	3	5	5	8
OR	24	2	2	5	10	8
PA	48	2	13	22	20	11
RI	16	2	1	1	3	6
SC	24	2	4	6	3	8

Function State	Water Monitoring and Surveillance	Research and Monitoring	Review of Plans & Specs for Municipal Waste Water Systems	Plant Inspection for Municipal Waste Water System	Oil and Hazardous Substance Spill Prevention and Response	Manpower Development
SD	15	2	2	2	3	3
TN	24	2	3	5	5	8
TX	48	3	7	9	14	11
UT	45	2	1	3	10	5
VT	15	2	1	1	5	3
VA	24	2	7	9	10	8
WA	24	2	3	6	20	8
WV	16	2	4	5	7	6
WI	36	2	5	8	10	9
WY	15	2	1	1	10	3

APPENDIX D

TRAINING NEEDS

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INTRODUCTION

When the manpower coordinators completed their occupational definition forms (see Appendix B) there was space on each form for specification of training needs for each type of occupation. What appears in the following pages is an assembly of the training needs specified on those forms in tabular form.

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TRAINING NEEDS

FUNCTION	OCCUPATIONAL DEFINITION	TRAINING REQUIREMENT (SUBJECT AREA)	FREQUENCY/DURATION*
ater Monitoring nd Surveillance	Water Quality Monitoring Survey/Network Director	• Field and lab techniques; quality control procedures	Annual/short course
		• Advancing technology in sampling and lab devices	Annual/seminar
	Water Quality Information Analyst	• Field and lab techniques; quality control procedures	Annual/short course
		• Advancing technology in sampling and lab devices	Annual/seminar
	Groundwater Monitoring Specialist	• Introduction to environmental protection and water pollution control	Orientation/short course
		• Water quality studies	Orientation/short course
		• Field and lab techniques	Annual/seminar
	Marine Monitoring Specialist	• Introduction to environmental protection and water pollution control	Orientation/short course
		• Water quality studies	Orientation/short course
		• Field and lab techniques	Annual/seminar

*There are three basic categories of "frequency": annual, quarterly, and orientation. All are self-explanatory. There are two categories of "duration": short course (approximately 1 week) and seminar (1 day or less).

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TRAINING NEEDS

FUNCTION	OCCUPATIONAL DEFINITION	TRAINING REQUIREMENT (SUBJECT AREA)	FREQUENCY/DURATION
Water Monitoring and Surveillance (Cont.)	Aquatic Biologist	• Introduction to environmental protection and water pollution control	Orientation/short course
		• Water quality studies	Orientation/short course
		• Field and lab techniques	Annual/seminar
	Microbiologist/Bacteriologist	• Introduction to environmental protection and water pollution control	Orientation/short course
		• Water quality studies	Orientation/short course
		• Field and lab techniques	Annual/seminar
	Chemist	• Introduction to environmental protection and water pollution control	Orientation/short course
		• Water quality studies	Orientation/short course
		• Field and lab techniques	Annual/seminar
	Laboratory Chief	• Field and lab techniques = available devices and advancing technology	Annual/short course
		• AQC seminars on use of new equipment	Frequent/seminar (as needed)
		• "State-of-the-art" for water quality lab operations	Annual/short course

TRAINING NEEDS

FUNCTION	OCCUPATIONAL DEFINITION	TRAINING REQUIREMENT (SUBJECT AREA)	FREQUENCY/DURATION
Water Monitoring and Surveillance (Cont.)	Water Quality Laboratory Technician	• Introduction to EPA AQC techniques	Orientation/short course
		• Water quality studies	Orientation/short course
		• Lab and field determination techniques	Annual/seminar
	Aquatic Sampler	• Water sampling techniques	Orientation/short course
		• Sampling devices	Annual/seminar
		• Methods for making elementary field determinations	Orientation/short course
	Data Support Director	• "State-of-the-art" in data reduction and retrieved operations	Quarterly/seminars
		• Water quality studies	Orientation/short course
		• Modeling techniques and new computer applications	Annual/short course
	Computer Systems Analyst/ Programmer	• "State-of-the-art" in data reduction and retrieved operations	Quarterly/seminars
		• Water quality studies	Orientation/short course
		• Modeling techniques and new computer applications	Annual/short course

TRAINING NEEDS

FUNCTION	OCCUPATIONAL DEFINITION	TRAINING REQUIREMENT (SUBJECT AREA)	FREQUENCY/DURATION
Plant Inspection for Municipal Waste Water Systems	Plant Inspection Specialist	None recommended	
	Plant Inspection Technician	• Procedures for completing inspection forms and reports	Orientation/short course
Oil and Hazardous Substance Spill Prevention and Response	Spill Prevention and Response Specialist	• Occupational safety considerations involved in activities dealing with hazardous materials	Orientation/short course
	Spill Prevention and Response Technician	• Occupational safety considerations involved in activities dealing with hazardous materials	Orientation/short course
		• EPA regulations, procedures for spill response, and planning for control of oil and hazardous materials	Orientation/short course
Manpower Development	Director, Manpower Development Staff	• Manpower/training techniques	Annual/1 week
		• Water pollution control requirements: policies, procedures, standards, equipment and processes	Orientation/1 week
	Manpower Specialist	• Manpower planning techniques	Annual/1 week
		• Training and education	Annual/1 week
		• Personnel management	Orientation/3 days

TRAINING NEEDS

FUNCTION	OCCUPATIONAL DEFINITION	TRAINING REQUIREMENT (SUBJECT AREA)	FREQUENCY/DURATION
Water Monitoring and Surveillance (Cont.)	Data Processing Clerk	• New equipment and techniques	Annual/short course
		• Importance of role of data processing in enforcement	Orientation/seminars
Research and Monitoring	Science Advisor	• Environmental research: "state-of-the-art"	As needed/seminar
		• Environmental monitoring: "state-of-the-art"	As needed/seminar
		• Technology transfer in environmental protection: "state-of-the-art"	As needed/seminar
	Research Assistant (to the Science Advisor)	• Environmental problems and issues	Annual/short course
		• "state-of-the-art" in research and monitoring programs	As needed/seminar
Review of Plans and Specs for Municipal Waste Water Systems	Senior Plans and Specs Reviewer	• New technology in design of municipal waste water systems	Quarterly/seminar
	Junior Plans and Specs Reviewer	• New technology in design of municipal waste water systems	Annual/seminar

TRAINING NEEDS

FUNCTION	OCCUPATIONAL DEFINITION	TRAINING REQUIREMENT (SUBJECT AREA)	FREQUENCY/DURATION
Manpower Development (cont.)	Training Specialist	• Modern education techniques	Annual/1 week
		• Water pollution training techniques	Annual/1 week
	Manpower Planning Specialist	• Latest manpower planning techniques or personnel management processes	Annual/1 week
		• Federal, state and local WPC manpower planning developments	Annual/ 3 days
		• Professional manpower planner seminar	Orientation/2 days
	Manpower Technician	• Manpower planning or training	Annual/1 week
		• Modern personnel management practices	Annual/1 week
		• Organizational relationships or policy formulation and procedures	Annual/1 week
	Certification Administrator	• Certification programs, reciprocity, testing instruments and training techniques	Annual/1 week
		• Personnel administration and personnel management practices	Annual/1 week
	Certification Clerk	• Certification programs	Orientation/3 days
		• Personnel administration and procedures	Annual/1 week

APPENDIX E

MEMORANDUM FROM PLANNING AND STANDARDS BRANCH

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REPLY TO ATTN OF: Planning & Standards Branch

DATE: 9 [illegible]

SUBJECT: Proposed Method for Forecasting Water Pollution Control Manpower Requirements

TO: Assistant Administrator for Air and Water Programs

THRU: Acting Director, Water Planning Division

On March 1, 1973, our Branches were informed of the requirements for the proposed method for forecasting water pollution control manpower requirements. Early estimates indicate that to respond adequately to this procedure for the planning programs will require a significant resource expenditure. We question whether this level of resource expenditure and this approach were envisioned in your memorandum of November 30, 1972, which indicated that the estimate would be based upon the completed work plans.

We recommend that a thorough review of the proposed approach be undertaken prior to commiting extensive program resources. The review could examine the following issues:

I. The expected results of the study and the utility of the data and outputs to the States and EPA Regions.

A. Variation among the State's programs in matters such as size and water quality problem types can be accounted in the proposed method, but only in a manner which is both complicated in assessment and gross in output. The method does not seem to respond to less quantifiable variations, such as organization, legislation, past effort, etc., all of which will have major impacts on levels and types of staffing.

B. Work units and outputs do not appear to respond to real State needs and problems, based on the numerous variations cited above. For example, a few States have established special units to handle "brushfires" (i.e., short term, short response time phenomena, fish kills, special projects, etc.). In most States, however, these

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time consuming problems are given to planning units, monitoring units or "as assigned" to the unit least busy at the time.

C. Job catagorization and experience levels proposed can produce only the grossest level of assessment, since they are not responsive to variations and real time problems as cited above. It has also been our experience that good people are more important to the program than job and experience labels.

D. Models based upon the above will have limited utility. Similar models might be produced by the manpower staff based on existing data previously provided to you by the State Programs Branch.

II. State reactions to product of the proposed method.

A. The States may have some negative response to the method since it essentially bypasses their estimates and inputs and ostensibly establishes models for them to follow based on a "Washington" assessment of their problems.

III. The appropriate level at which to conduct the study.

A. Limited contact with the States by Headquarters staff restricts their capability for making State-by-State assessments of staffing needs, especially given the wide and changing variations cited above.

B. While the Regional offices have both greater contact with the States and greater knowledge of field conditions, they are restricted by a relative lack of knowledge of new program requirements.

C. Both Headquarters and the Regions have major resource constraints, especially in this time of new program development and implementation.

IV. Alternative approaches.

A. The lack of apparent need, the apparent lack of direct applicability of data and associated analysis, the apparent lack of utility of outputs, the possible negative State response and the extensive resource commitments necessary, indicate that one alternative available is to cancel the project.

B. A second alternative available is to delay the conduct of the study until new program requirements are fully developed and made public and more time is available to program elements. This alternative may be combined with C below.

C. A third alternative would be to have the study conducted at the State level by a consultant. The contractor can consult with Headquarters staffs on program requirements and with the Regions on field conditions, past and current State program quality, proposed State programs, etc. A sample of 10-15 model States can be derived from existing Regionally selected, "best" State program unit models (e.g., best permitting operation, etc.) might be considered rather than using whole States as models. This approach might reduce negative attitudes created by "model State" comparisons.

D. Finally, a fourth approach might be one previously discussed with Mort Ettlestein. That is, structure several idealized "type organizations" which could then be used for manpower estimations. This is not as neat a procedure but it would produce useful results for estimating national or regional requirements. It could also be done relatively quickly.

We feel that a project review based on these issues will improve utility of the products of the study and produce a better utilization of EPA program resources.

Joseph A. Krivak
Chief, Planning & Standards Branch
Water Planning Division

James Boginis
Chief, State Programs Branch
Water Planning Division

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